

THE SCHOOL REVIEW

A JOURNAL OF SECONDARY EDUCATION

VOLUME XX
NUMBER 5

MAY, 1912

WHOLE
NUMBER 195

THE MEASUREMENT OF EDUCATIONAL PRODUCTS¹

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The business of man, I suppose, is to change the world for the better. Things and men have to be reformed so that they will satisfy better those wants which reason finds worthy. And man's wants also must be changed. The guide of reason in changing things to fit human wants, and in changing men themselves to fit their nobler possibilities and the common good, is science—matter-of-fact, verifiable knowledge of the nature and causes of changes in things and men.

Education, like history, economics, sociology, and the other sciences of man, is just beginning to give promise of quantitative knowledge, of descriptions of facts as numerically defined amounts, and of relations or laws in terms of rigid, unambiguous equations. The changes that take place in intellect and character are coming to be measured with the same general technique, and, we may hope, with the same passion for clearness and precision, which has served the physical sciences for the last two hundred years.

I shall try today to describe one feature of this quantitative work in the science of education—perhaps I should say, this quantitative work toward a science of education. I wish that my description might be adequate, so that those of you who esteem the definiteness and rigor of the physical sciences would be led to agree

¹Paper read at the meeting of the Harvard Teachers' Association, Cambridge, Massachusetts, March 9, 1912.

with me that a science of the changes produced in man by education may be made just as definite and exact—and so that those of you who esteem the significant and universal application of the humanities would admit that the life of man gains a new dignity when the insights of the dramatist, sage, or statesman are reinforced by measuring-rods and scales for weighing and accounting for human nature and behavior.

The need for measurement of the differences made by education—of educational products—is equally demonstrable whether our concern is with education as a science or education as a business. However it is defined, education concerns the production and prevention of changes in human beings; and a science of education must identify these changes, compare them, and relate them to their causes. To do this it must measure them. The balance-sheet of education as a business has as its credit side certain educational products—knowledge of such and such school subjects, habits of courage or persistence, and the like, skill in this or that trade or profession, added interests, refinements of taste, ideals of honor, service, and truth. It is fruitless to keep only the debit account—of time and money expended, of teachers, books, supplies, buildings, courses of study, and methods of teaching and the like, leaving the credit account—the results achieved, the products of education—vague and insecure.

There are peculiar difficulties in keeping an accurate account—in measuring the changes which are the data for the science of education. The facts are extraordinarily complex, very widely variable, and do not at all readily suggest units, scales, or graded standards by means of which they may be identified, compared, and related.

So apparently simple an ability as ordinary addition of integers can be shown to require analysis into at least nine separate abilities, each of which probably requires further analysis, in one case, into perhaps ninety component ability-atoms. The achievement of any pupil in any matter of intellect, character, or skill usually varies widely, so that many measurements of ostensibly the same fact have to be made to relieve it from its chance or accidental error. Scales, graded standards, by which to report knowledge of German,

ability to spell, skill in cooking, original power in mathematics, appreciation of music, or any educational fact you may think of, are now where the thermometer, spectroscope, and galvanometer were three hundred years ago—they do not exist.

The beginnings that are being made toward overcoming this third difficulty are my special topic today. I ask you to consider the requirements of a valid scale of measurement in general, and to consider whether we can meet them in measuring educational products.

The ordinary scale for weight, zero, one gram, two grams, three grams, and so on, exemplifies an ideal scale in four respects: First, it is a series of perfectly definable facts. All men over all the world may know exactly what is meant by two grams or four grams. In the second place, each amount is a different amount of the same kind of thing. "Four grams" is so much of the same kind of thing of which "two grams" is "two grams." In the third place, the differences between any two of the amounts are perfectly defined in terms of some unit of difference. The step from four to five grams is the same as the step from forty-seven to forty-eight grams, and so on. Lastly, the zero point of the scale is absolute; that is, it means just barely not any of the thing in question. I shall take these points in order.

Can we, then, in a science of education, get a series of perfectly defined points of the amount of some thing, so that all men may know what each man means by the statement he makes, as all know it in the case of "one gram" or "two grams"? At the present time we have certain descriptions or identifications of these points on the scale, or amounts of the thing. We say, in the case of handwriting, "a good plain hand," which is about as useful a statement—of about the same character—as if, in describing the weight of a body, we should say, "as heavy as a baby." In describing the ability of a pupil in German, we say "His knowledge is about equivalent to that required for passing intermediate German." That is about as if, in describing the length of an object, we should say, "It is about as long as a man can jump." In measuring a Freshman's composition in English in Harvard College, we say it is of "C" grade. That is about on a level with the statement that

a glass of water is "tepid;" and although there may be a certain emotional appropriateness in the use of the word "tepid" to describe the Freshman's composition, as a scientific measure it is hardly adequate.

Now it is an easy task, theoretically, for educational science to take these vague, ambiguous statements of common-sense and refine them as physical science has in the past refined similar measures in the case of physical facts. We can, for example, define a good plain hand by printing a sample of it. If I should write on the blackboard with a certain degree of legibility and beauty, and if this association were to say, "That is what we call a good plain hand"; and if we were to have copies made of it, so that people could see it; and if we should get the people of the United States and of other countries to agree that "a good plain hand" meant a hand as good as, and no better than, the printed sample in question—then we would have one point on the scale thereby defined.

In the case of spelling, we can define a point on the scale as the ability to spell words as hard as, but no harder than, "at" and "go," or "wish" and "touch," and so on to "millinery," "development," or words of any difficulty we choose. We could, in the case of German, agree upon a series of passages, graded in difficulty of translation, and say, "What we mean by ability 'four' is the ability to translate *this* passage with a certain degree of precision, but not to translate the next more difficult passage," and so on. Such a series of passages would be easy enough to get, and would define for us points in this particular scale. Similarly we could get a series of originals in mathematics, graded in difficulty, which would define a series of points on the scale of mathematical ability. We could in the same way define the amount of merit in an English composition by an actual sample. Lately my friend Mr. Hillegas has been engaged in doing that in the case of English writing by young people in their teens.

The second requirement of the ideal scale, you will remember, was that the different amounts should be amounts of the same thing. Here again the present practice is far from as advanced as we would wish. Take the case of ability in arithmetic, in grammar-school pupils, for example. As you well know, our measurement of

ability in arithmetic actually is a measurement of two different things: sheer mathematical insight and knowledge, on the one hand; and acquaintance with language, on the other. For example: suppose I give this problem to pupils in the second grade at school, "If you already had two cents, and someone gave you three cents too, what sum would you then have in all?" Suppose that a day later, I give the problem, "How many are three and two?" As you all know, the percentage of children getting the second example correct would be far higher than in the case of the first example. The first test is not so much in arithmetic as in language; the difficulty is in the words "already," "too," "someone," "would," "in all."

In the case of spelling, ordinary measurements of achievement mix up knowledge of spelling proper with an acquaintance with words and meanings. For example, to be able to spell the words "too" and "there" requires mainly ability in spelling; but the ability to spell correctly the words "Popocatapetl," "Abracadabra," would require to some slight degree a knowledge of spelling, but largely a wide knowledge of the language.

Those of you who teach languages in secondary schools are well aware that the ordinary college-entrance examination and also your own tests of achievement in a language are scales which measure two things. Part of the difficulties which pertain to translating a passage in a foreign language arise from the difficulty of understanding the general thought of the passage. We have all, I fear, given our pupils passages which, so to speak, they could not translate even if they were given in English! They would not know what they meant, if they were given in English. The difficulty would be that they did not have the general knowledge of affairs and things to understand the meaning of the passage in any tongue. Here again there is nothing impossible in the task. We can separate out, by skilful experiments, achievement in mastering spelling difficulties proper, apart from the difficulties of mastering a general acquaintance with English words. We can devise passages such that the facts and relations are simple, but the German, the French, or the Latin, is difficult; and other passages where the French or German or Latin is easy, but the meaning is

difficult. We can separate into two scales these two sets of facts measured.

For the purpose of what I have to say, let us assume, then, that we are measuring the same sort of thing, and that we have reached a point where we have, as our identified quantities, or amounts, or "scale-points," things which are in a linear series, and which differ *in amount only*, being of the same quality or thing or product.

The third requirement of the ideal scale was that the differences between any two scale-points or values should be rigorously and perfectly defined in terms of some unit of difference. Now we come to a point where very little has been done by our educational practice. Most of the quantities that we assign in education signify only relative positions, really. We perhaps make a pretense at their being differences in amount. When we say that one pupil is "75" and another is "80," a third is "85," another is "90," and another "95," if there is one thing we do know, it is that the step from 98 to 99 is, as a matter of fact, almost never equal to the step from 59 to 60, or 49 to 50. We do not know what their proper ratios are, however. Nobody here could tell from any given set of grades or averages of grades what the exact relation of the difference between 65 and 70 was to the difference between 85 and 90. We do not know, with respect to general educational products, whether the step from grammar-school to high-school graduation is equal to, less than, or greater than, the step from high-school graduation to college graduation; much less can we put the two steps into an exact ratio. We do not know whether the step from a barely legible handwriting up to a good plain hand is equal to, less than, or greater than, the step from a good plain hand to a perfect, copper-plate writing; much less could we put the differences in terms of an exact ratio.

The problem, then, is to take the differences in relative merit that we all observe in school products and turn these into precise differences of amount. This can be done. Here, I shall have to take you into a somewhat technical discussion for a few moments. In fact, to deal with the subject properly, I should have to go through a rather laborious discussion of the logic of quantity generally. I take equality of steps of difference, which is the simplest case

rhetorically, though all I say applies to getting any ratios between differences defined. When a difference is not always noted by competent judges, we may say that two differences are equal which are equally often noted. If, for example, we had four samples, 1, 2, 3, and 4, of English writing, such that 80 per cent of an expert group said that 1 was better than 2, whereas 20 per cent said that 2 was better than 1, and 80 per cent said that 3 was better than 4, and 20 per cent that 4 was better than 3; then, in a very important, and, with certain limitations, true sense, we can say that the difference between 1 and 2 is equal to the difference between 3 and 4, because it is equally often noticed by equally competent judges. This method of turning measurements by relative positions into measurements in terms of units of amount was first used, very roughly, by the late Mr. Francis Galton, an eminent English man of science. It has been used by Professor Cattell and others at Columbia University; and it is used in many fields of human life, apart from education. It is the most convenient tool whereby to express the steps of difference, and define the distances of one point from another, of all the educational scales that we have. I shall illustrate this by reading six compositions by pupils of high-school age, which, by such use of the opinion of two hundred experts—common-sense people, experts in education, teachers, literary men, editors, and the like—are found to differ by approximately equal steps. These steps are not absolutely equal, being in fact 11, 10, 11, 9, and 10. I will read the compositions, in their order, from the lowest up:

26. "Advantage evils are things of tyranny and there are many advantage evils. One thing is that when they oppress the people they suffer awful I think it is a terrible thing when they say that you can be hanged down or trodden down without mercy and the tyranny does what they want there was tyrans in the revolutionary war and so they throwed off the yok."

37. "When Sulla came back from his conquest Marius had put himself consul so sulla with the army he had with him in his conquest siezed the government from Marius and put himself in consul and had a list of his enemys printy and the men whoes names were on this list we beheaded."

47. "First: De Quincys mother was a beautiful women and through her De Quincy in hereted much of his genius.

"His running away from school enfluenced him much as he roamed through the woods, valleys and his mind became very meditative.

"The greatest influence of De Quincy's life was the opium habit. If it was not for this habit it is doubtful whether we would now be reading his writings.

"His companions during his college course and even before that time were great influences. The surroundings of De Quincy were influences. Not only De Quincy's habit of opium but other habits which were peculiar to his life.

"His marriage to the woman which he did not especially care for.

"The many well educated and noteworthy friends of De Quincy."

58. "The passages given show the following characteristic of Fluellen: his inclination to brag, his professed knowledge of History, his complaining character, his great patriotism, pride of his leader, admired honesty, revengeful, love of fun and punishment of those who deserve it."

67. "Ichabod Crane was a schoolmaster in a place called Sleepy Hollow. He was tall and slim with broad shoulders, long arms that dangled far below his coat sleeves. His feet looked as if they might easily have been used for shovels. His nose was long and his entire frame was most loosely hung-together."

77. "When at last it did arrive the postmaster began to quickly sort the bundles, we waited anxiously. Immediately upon receiving our bundles, I lashed the horses and they responded with a jump. Out into the country we drove at reckless speed—everywhere spreading like wildfire the news, 'Victory.' The exhilaration that we all felt was shared by the horses. Up and down grade and over bridges, we drove at breakneck speed and spreading the news at every hamlet with that one cry 'Victory.' When at last we were back home again, it was with the hope that we should have another ride some day with 'Victory.'"

The second sort of argument is somewhat more intricate. Suppose that we have a scale running from a low to a high degree of achievement, say, in solving geometrical problems. And suppose that we know the geometrical form of the distribution of, say, fourth-year high-school pupils with respect to that achievement. Let this be a rectangle, a half circle on the linear scale as base, the normal probability-surface, or any other. Then, from the percentages of such pupils solving problems A, B, C, D, etc., we can determine the ratios $\frac{A-B}{B-C}, \frac{B-C}{C-D}, \frac{C-D}{D-E}$, etc.

Thus suppose the form of the distribution of ability to be that defined by the scale line as a base and the line $Y = Pe^{-\frac{x^2}{2npq}}$, and call L the achievement of solving a problem which 9,987 out of 10,000 such pupils can solve. Call H the achievement of solving a problem such as only 13 out of 10,000 such pupils can solve.

To get a series of, say, 13 achievements varying from *H* to *L* by 12 equal steps we shall have to find problems which can be solved by 13, 62, 227, 668, 1,586, 3,085, 5,000, 6,915, 8,414, 9,332, 9,773, 9,938, and 9,987 out of 10,000 of the group respectively.

This method has so far been used only once or twice, but is likely to become of great importance in the case of certain educational products.

Neither of these methods of defining the difference between facts is that commonly used in the physical sciences. To the physicist, those differences are equal which are products of the same cause in the same circumstances or which, under the same conditions, produce the same effect. The difference between nine inches and ten inches is equal to the differences between six inches and seven inches because one standard length produces either difference. One degree of temperature is equal to any other degree of temperature, in the sense that it will raise the mercury the same distance. We can do something like this in education, though it becomes rather difficult, and careful logic is undoubtedly required.

The last element of a valid scale was that it should be referable to a zero which meant just barely not any of the thing in question—that is, an absolute zero. The importance of this may not appeal to many of you; it does not appeal to people generally. What an absolute zero does is to permit us to use the “times” judgment—to say that this educational achievement is twice or one-half or three-fourths times that; speaking algebraically, it enables us to use equations with two instead of four unknown quantities, because the zero points are true zero points.

If you ask anyone to tell you what he means, or show you what he means, by “just barely not any originality in mathematics,” or “just not any merit in handwriting,” he is likely to be amused, and say that he never thought of it, and does not intend to! But I must confess that to me it appears that such a person has not clearly defined his ideas. A person cannot think accurately or wisely about any quantity until he has referred it to an absolute zero on some scale. Now the fact that zero points do not stare us in the face in the case of mathematical originality, or knowledge of German, or ability in writing, as they do in the case of measures of

length, weight, and time, is no excuse for not trying to get them. They can be got, at least approximately. For example, if we define the zero of ability in spelling as the ability to spell a word like "go" or "so," we shall not be far astray, for if a child has reached a point where he can be measured at all in respect to spelling and is not able to spell these words, he is approximately at just not any ability at all in spelling. I think if we should agree that for a pupil just not to know the meaning of "ja" and "nein" under ordinary conditions of life in New England today would indicate that he was approximately at the zero point in knowledge of German, we should not be far astray. If he knew that "ja" meant "yes" but did not know that "nein" meant "no," he would be so close to the zero point that our error would be slight.

In handwriting, a handwriting which is recognizable as handwriting, but is of just not any beauty or legibility, is not hard to define. Fig. 1 may serve roughly. We should say that this was handwriting; it is not a house, nor a mere test of motor skill; it is, in a sense, handwriting; but it has no legibility or beauty. The zero point in the case of composition was determined by the judgment of forty experts, divided about equally between men of

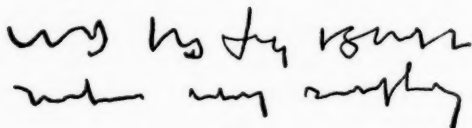


FIG. 1

affairs, expert psychologists, experts in education, practical schoolmen, and literary men themselves. The sample taken as zero of merit for writing by young people in their teens was:

Dear Sir: I write to say that it aint a square deal Schools is I say they is I went to a school. red and gree green and brown aint it hito bit I say he don't know his business not today nor yesterday and you know it and I want Jennie to get me out.

If we get scale points defined, and their distances defined, and establish an absolute zero, there is no further difficulty in constructing a scale for achievements of human nature. Such scales have every logical qualification that any of the scales for physical measurement have.

There is no limit, theoretically, to the kind of thing for which scales are practicable. I have chosen for convenience the simpler and easier cases. But the arguments apply equally to the sense of evidence in history, excellence of judgment in affairs, devotion to the common good, or any quality, no matter how complex, that one may take.

It may save the time of all of us if I say just a word or two about two or three objections.

It may be said, "All this is unnecessary; the good old adjectives are enough for educational work." All that I have to retort is that for the kind of educational work that the person who makes this objection usually wishes to do, probably the old adjectives *are* all that is necessary.

A stronger objection would be that the common-sense judgment of a first-rate man without these units and scales is better than the action of the stupid man or incompetent man, with them. That is, of course, true—that a good man can do better work without them than a stupid man with them. It is precisely the work of science to get good work done by those of us who are rather mediocre. Thanks to the progress of science, we can now solve problems that Aristotle could not solve. We should all prefer to have for our children a stupid doctor of today, who nevertheless understood the use of antiseptics and antitoxins, than Galen or Hippocrates, though in respect to common-sense there would be no choice.

The third objection is one that a certain type of person feels very keenly, namely, that the personal, spiritual work of education—the direct human influence that the pupil may get—is not in the domain of exact science. But that is not a valid objection. Mothers do not love their babies less who weigh them. We do not serve our country less faithfully because we take its census, survey its coastline, or compute its resources. Education will of course always need its poets, its artists, its craftsmen, as well as its managers and men of science, but it needs these also. There is no reason why the artistic life should be impeded by the life of measurement. There is no reason why sculptors should sulk because surveyors prosper; or why a poet should feel badly because his odes are printed on paper whose length and breadth are known, and which is sold for a money price.

MEASURING EDUCATIONAL PROCESSES THROUGH EDUCATIONAL RESULTS¹

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Fifteen years ago the school superintendents of America, assembled in convention in Indianapolis, discussed the problems then foremost in educational thought and action. At that meeting a distinguished educator—the pioneer and pathfinder among the scientific students of education in America—presented the results of his investigations of spelling in the school systems of nineteen cities. These results showed that, taken all in all, the children who had spent forty minutes a day for eight years in studying spelling did not spell any better than the children in the schools of other cities where they devoted only ten minutes per day to the study.

The presentation of these data threw that assemblage into consternation, dismay, and indignant protest. But the resulting storm of vigorously voiced opposition was directed, not against the methods and results of the investigation, but against the investigator who had pretended to measure the results of teaching spelling by testing the ability of the children to spell.

In terms of scathing denunciation the educators there present, and the pedagogical experts, who reported the deliberations of the meeting in the educational press, characterized as silly, dangerous, and from every viewpoint reprehensible the attempt to test the efficiency of the teacher by finding out what the pupils could do. With striking unanimity they voiced the conviction that any attempt to evaluate the teaching of spelling in terms of the ability of the pupils to spell was essentially impossible and based on a profound misconception of the function of education.

Last week, in the city of St. Louis, that same association of school superintendents, again assembled in convention, devoted

¹An address delivered before the Harvard Teachers' Association, Cambridge, Massachusetts, March 9, 1912.

forty-eight addresses and discussions to tests and measurements of educational efficiency. The basal proposition underlying this entire mass of discussion was that the effectiveness of the school, the methods, and the teachers must be measured in terms of the results secured.

This change represents no passing fad or temporary whim. It is permanent, significant, and fundamental. It means that a transformation has taken place in what we think as well as in what we do in education. It means that education is emerging from among the vocations and taking its place among the professions.

This profound change in our educational practice has not come through the slow processes of philosophy, nor because we were awakened by the stirring words of voice or pen of any educational prophet. Few school men can claim great credit for having hastened its advent. It was forced upon us, first, by the natural results of compulsory education, and still more definitely and directly by the exactions of the scientific age in which we live.

THE SCIENTIFIC METHOD IN EDUCATION AND INDUSTRY

This new attitude of educators toward education means that we have ceased exalting the machinery and have commenced to examine the product. We have awakened to a startled realization that in education, as in other forms of organized activity, applied science may avail in improving even those processes that have rested secure in the sanction of generations of acceptance.

The transformation now taking place in education means that it is our privilege to be part of a movement that is working changes comparable to those that are now remaking almost every form of industrial activity. The trade of brick-laying, practiced by millions of intelligent artisans, has remained almost unaltered since the days of primitive man. But scientific management steps in and asks, Why lower a hundred pounds of human flesh to pick up each two-pound brick? Why toss the brick four times to find its best face? Why tap it three times to get its proper level? Why stand in a position that requires a half-dozen movements when one will suffice? And science makes answer: Build a platform for

the bricks adjusted to the height of the work; lay the bricks on the platform with the best face out; mix the mortar so that one tap will suffice; and take such a position that five movements accomplish the same results that formerly required eighteen. The result is that each workman lays as many bricks in one hour as he formerly laid in three.

The ideals and processes of the application of the scientific method to education are in salient respects similar to those that are reshaping the processes of industry. In education, as in industry, the scientific idea is at base analytic scrutiny, exact measuring, careful recording, and judgment on the basis of observed fact. Swiftly, silently, and almost without warning, the scientific methods have invaded the educational camp and have begun to demolish the hosts of theory, legend, superstition, and tradition.

The time has already passed for us to query whether or not we shall indorse and adopt the new scientific attitude of exact measurement and judgment by results. The new method is upon us and the question at issue is no longer, "Shall we adopt it?" but rather, "How shall we utilize it?"

REFORM IN EDUCATIONAL ADMINISTRATION

Three years ago twenty-nine cities in America had systems of individual record cards for keeping the school histories of their children. Today 216 cities have adopted a uniform system for this purpose. Those cities intend to judge processes by results.

One year ago the number of city school systems having uniform records of accounting whereby the school facts of one locality could be compared with those of another was about fifteen. Today the number of such cities is 418. Their aim is a mutual comparison of results.

Seven years ago Superintendent Maxwell, of New York City, published data in his annual report showing that 39 per cent of the school children of that city were above the normal ages for their grades. Judged by the age standards, they were educational misfits. At that time these data were almost unique and attracted widespread attention because of their unusual character. Today such methods of checking up the results of our school work are

commonplace and a few months ago the Federal Bureau of Education published similar data showing conditions in 318 cities.

These nation-wide changes are not products of mere chance. They have come because the public and the educators have begun to demand real information about their public schools. Less than five years ago it occurred to a few people in America seriously to ask the question, "What proportion of the children who enter our common schools remain to complete the course?" This was a plain business proposition. The question at issue was the relation of the finished product to the raw material. The children who enter our public schools in the first grade are the raw material; those who complete the course and graduate are the finished product. It was an elementary question in business administration that these students were asking when they inquired what proportion of the children complete the common-school course.

In order to answer this question we must have two figures: First, the number of children who graduate. That can easily be ascertained in any school system. Second, the number of children who begin school each year. That cannot be obtained so easily. Incredible as it may seem, up to five years ago school men had never thought it worth while to record that datum. A patient search showed that the cities in America recording the number of children entering school each year could be counted on the thumbs of two hands. Today the number of cities keeping such records runs into the scores. At that time, all that the school superintendents knew about the matter was that the beginners were numerous; that progress was not uncommon; and that there were some graduates each year. Now they know that in the country as a whole not one-half of the children who enter the public schools remain to graduate, and they are busily at work remaking their school systems to remedy that condition. The startling revelation that our vaunted system of free education was failing to give even complete elementary schooling to a majority of the children evoked imperious demands for more real facts. Here were statements of educational conditions within the comprehension of all and painfully obvious in their significance. They left no room for question as to the necessity for checking up results in education.

The school children are the invested capital of the community. What should we say of a bank that kept its accounts in the same way that the school has kept account of the invested capital of society? What would you say if your banker should confess that the only facts revealed by his books were the total number of accounts handled during the year and the average monthly assets? What would you say if he should confess that he did not know and could not find out anything about the number or amount of new accounts received, old ones withdrawn, or the results of his investments?

Nor was this situation confined to elementary schools. Conditions in our higher schools were even more shocking. The proportion of the pupils who completed the course as compared with those who entered was startlingly small. We can hardly imagine an analogous situation in any commercial industry. What, for example, should we say of a four-act play in a theater where a thousand people were present at the beginning of the first act, five hundred got up and left before the beginning of the second act, two hundred and fifty of these refused to sit through the third, and only one hundred and twenty-five remained to see the final descent of the curtain? And yet these figures express the situation in many of our larger cities with respect to the falling out of pupils in the four years of our high-school course.

AUTHORITY VERSUS EVIDENCE

The new method which judges processes in terms of results has been by no means confined to the development of record forms and the perfecting of new devices in the statistics of school administration.

About three years ago a graduate student in one of the universities of Massachusetts tried to investigate the old problem, "What is the best age at which to send a child to school?" In his search for information he put the question to the head of every college department of pedagogy in the country. He received definite and positive replies from almost all to the effect that the best entering age is a comparatively late one. He then followed his first inquiry by a second in which each pedagogical expert was

asked on what he based his assertion. In every case save one the answer was that the writer was positive of the correctness of his views, but had no evidence with which to substantiate them. The exception was a man who said that he knew, because his own son had entered school late and had made good progress. This happened only three years ago and the answers were speculative and indefinite because quantitative evidence bearing on the problem did not exist. And yet so rapid is the progress that has since been made that there is published in the current number of *Education* a study of that problem based on the school histories of more than twenty-five thousand children.

From a Michigan city there comes a striking illustration of the degree to which educators have enjoyed that freedom which comes through being entirely unhampered by facts. About five years ago a movement gained headway in that city for the establishment of kindergartens. The advocates of the proposed innovation gave as their most weighty argument the claim that children who pass through the kindergarten subsequently complete the elementary grades in less time than do those who have not enjoyed the advantages of such training. The faction opposing the establishment of the kindergartens denied the validity of this argument. To settle the question the school authorities wrote to school superintendents all over the country asking whether children who had gone through the kindergartens subsequently completed the work of the grades more quickly than did those who had not received such training. Replies were received from the superintendents of 72 cities. Of these, 49 answered that they thought that children having kindergarten training subsequently made more rapid progress than the others, but that they did not know. The other 23 replied that they held the opposite opinion, but that they did not know.

That result was typical of the supremacy of speculation over evidence in education. In this problem, as in other problems, opinions have varied. There has been a consensus of belief but there has been an almost absolute absence of definite knowledge. Kindergartens have been increasingly numerous in America since Elizabeth Peabody established the first one in Boston in 1868.

They now exist by the thousands, and on them we have spent each year hundreds of thousands of dollars. During the entire period a favorite argument in their support has been the one relied on to secure their establishment in the Michigan city, and yet until the past five years no one has been able to state in definite terms anything about the real effect of kindergarten training. This situation no longer exists, for within the past three years extensive investigations have been conducted, comparing the school histories of many thousands of children who have had kindergarten training with the school histories of the children in the same systems who have not had kindergarten training.

EDUCATIONAL SURVEYS

The new scientific method has not been confined to the investigation of isolated problems. In city after city across the country its aid is being invoked to evaluate educational results through the medium of the school survey. Unheard of only a few years ago, these city-wide educational inquiries have been made or are in progress in such cities as Boston, Baltimore, Boise, Montclair, Orange, and New York. Already they are being planned in other localities, and one embracing the system of the entire state of Wisconsin is now under way.

CONSERVATISM VERSUS PROGRESSIVISM

The progress of this educational revolution has been stoutly contested and each forward step has been greeted by an anvil chorus of opposition in which the notes ranged from the grudging admissions of the skeptic to the fiery denunciations of the educational reactionary. Always retiring and always fighting, these forces of opposition have abandoned as untenable their contention of fifteen years ago, that any and all attempts at measurement in education are silly and dangerous. Having given up this position, they next took refuge in the firm declaration that while material matters in education may be quantitatively investigated, the immaterial problems of the teaching process can never be submitted to such treatment. They admitted that it would probably do no harm to discover the more important facts with

respect to financial expenditures and the progress of pupils, but firmly declared that no phase of intellectual phenomena would yield to statistical analysis.

THE MEASUREMENT OF EDUCATIONAL PRODUCTS

No sooner was this doctrine fully formulated than there appeared a set of scientific students of education presenting measuring scales with which to gauge the performance of the children in their classroom work. Thorndike with his measuring scales for handwriting, Stone and Courtis with their standardized tests in arithmetic, and Hillegas with his method for measuring the quality of English composition again forced the champions of tradition to retire and find a new point of defense.

CHARACTER AND EFFICIENCY

The final citadel in which the old guard is now making its last stand consists of the objection that the most important elements of true teaching can never be measured.

They claim, and they are right in claiming, that we can never determine by mathematics the degree to which the strong man and the noble woman can influence for good the characters of their pupils. But what they overlook is the fundamental truth that in education, as in other pursuits of life, character and efficiency go hand in hand. As school executives make practical application of the newer scientific tests, no fact stands out with more impressive distinctness than that the teachers whose classes make the best records are the teachers who are the most truly successful in the shaping of character.

INDIVIDUAL DEVELOPMENT NOT UNIVERSAL UNIFORMITY

There remains one other objection, less frequently advanced, but sometimes voiced, namely, that the advocates of the scientific method aim to reduce all work in education to the dead level of uniform precision. This charge is born of a complete misunderstanding of the ends, aims, and processes of the new method. Its aim is not uniformity but individual development. The measured beat of the concert recitation is not music to the ears of the scientific students of education. The sight of a rigid row of reciting

children with toe tips nicely adjusted to a line painted on the classroom floor does not cause their souls to leap in admiration. Their ideal of school discipline does not consist of having a roomful of growing children accomplish the amazing feat of sitting through an entire period without moving a muscle or winking an eye. Their ideal of educational administration does not contemplate a uniform country-wide daily program by which each recitation period in every city and hamlet shall be fixed by a master clock located at the seat of the national government in Washington.

THE SCIENTIFIC METHOD MEANS THE MEASUREMENT OF RESULTS

The object of the new method is the substitution of evidence for opinion and knowledge for speculation. Its champions are working to develop measurements in education because they realize that only by this method can education become an art and a science and its practice be changed from a vocation to a profession. They scan the history of science and remember that through the development of measurements astronomy grew out of astrology, chemistry emerged from alchemy, and physics developed from mystery.

They read the history of education and realize that the astonishing progress of the past decade has come from shifting the position of inquiry from asking "What results can or might we get?" to "What results are we getting?" This makes the pupil and not the teacher the center of interest. It calls a halt on the futile quest for standards of attainment on which we have never come to an agreement, and aims instead to discover units of measurement. Simple as it sounds, this change from asking "What results should we get?" to asking "What results are we getting?" is the keynote of the whole scientific method in education. To answer the question in its new form means the development of units of measurement, and when these are secured the standards of attainment will work themselves out automatically.

THE FUTURE

The certainty about the scientific method in education is that it is with us. That it will develop enormously in the immediate

future is entirely sure. What its effects will be we can as yet only surmise. The dangers involved are as real and imminent as the advantages are self-evident. These dangers will arise from the mass of superficial and erroneous results that will certainly be presented to the educational world in the guise of scientific contributions to applied pedagogy. What is to be our attitude toward each new contribution?

My own answer is that we must welcome them all, but challenge them all, and attempt to verify them all. Every figure, every process, and every conclusion, whether presented by the educational expert or by the novice, must be submitted to the most rigid scrutiny and searching analysis before being accepted as worthy of inclusion in the new pedagogy.

In proportion as we are thus enabled to retain the genuine and reject the spurious, education will move forward among the other sciences. Its new methods will substitute knowledge for speculation and evidence for opinion. Its marshaled facts, expressed in definite terms, will demolish the hosts of legend, superstition, tradition, and theory.

Under the new régime the studies to be included in the curriculum and the methods by which they are taught must have a more valid reason for being than the fact that our forefathers had them in their schools.

"How much?" and "How many?" and "With what result?" are going to displace guess-work, imagination, and oratory as criteria for shaping educational policies. The old method has been education within the sheltering walls of the cloister in which an occasional peep-hole has been cut, to satisfy the parent and silence the taxpayer. The new method proposes education in the open and under the clear and penetrating rays of the search-light.

DISCUSSION

FRANK V. THOMPSON, Assistant Superintendent of Schools, Boston.—A year ago we were deliberating on the question whether the element of vocation in education seriously threatened our cherished cultural ideals. You may recall that it was hard work to raise an issue—and that apparently all the opinions expressed were upon the negative. In a short year, educational attention has focused upon the question of educational products—their extent, reality, and values. Contemporaneously in industry and business has come the movement known as scientific management. It is a favorable sign to note that education today is so sensitive and responsive to the spirit of progress outside academic walls. Modern education feels that all the influences, inventions, and improvements of promise affecting extraneous agencies are of vital importance to the school. Modern education is human, no longer merely scholastic.

Education today wishes to be efficient, as industry is efficient; education wishes to know what the product is, and to gauge the time, quantity, and value elements. We speak in education today of vocation and culture. We are going to define the terms, and we are going to see that we actually produce what we say we are doing. We are going to determine the ratio of product and time; we are going to define standards; we are going to eliminate waste—in a word, we are going to try to be efficient, in conformity with the world-wide ideal of efficiency. But efficiency we know is a relative term. There is only one way to determine efficiency, and that is by measurement. Education cannot assume an efficiency-ideal without adopting its concomitant, namely, measurement. Hence our particular consideration this morning rests upon the topic of tests of school efficiency.

Indeed, it may be admitted that the school has always sought to gauge its products; the accumulation of school statistics has grown to be enormous. We have our figures dealing with examinations, attendance, promotions, retardations—in a word, a very definite system of educational measurement.

Why, then, the need of a new system of measurement, it may be asked? The answer probably is this: The measurements employed in the past were not fundamental. These measurements dealt with standards peculiar to the school; they did not vitally touch life. Our standards have lacked objectivity and could not be interpreted in the common terms of life-activities and experiences. On the other hand, our school standards have not even achieved their own limited ends, and the defects and limitations of school statistics are becoming increasingly apparent, particularly when measured by newer standards. School statistics today stand properly indicted.

Now, like all movements receiving temporary emphasis in education, the present exaltation of measurement will need to run the gauntlet of its predecessors. There will be scoffers and zealots, and those who will wisely profit. It

is easy to point out evident dangers. Measurement in education presupposes commensurable quantities, and many of the best products of education are incommensurable. There are spiritual and there are material products of education. Over the first of these there will be ever the veil of mystery and doubt. Man spiritually has always been the enigma of existence, and will continue to be so. We can never plot the curve of genius nor measure the unit of inspiration. But a vast amount of educational effort is measurable, and a wiser method of measuring it is to be welcomed.

Our discussion today deals with the measurable products of education. In devoting our attention to such matters, we do not for a moment lose our sense of values, of the higher, constant, and general aims of education. These values are measured only in the lives of citizens, in the creations of genius, and in the greatness of nations. It is best to begin on things which all agree are measurable. It may be that we shall see the extension of the possibility of measurement over many fields of what we now consider the spiritual side of education, but to assume that all activities are measurable would be inexpedient, to say the least, and, to my mind, unfortunate.

But in the undisputed field of measurable quantities, I believe that we are bound to overhaul the present means of measurement of educational facts and products. The day of the educational engineer is at hand. Methods, programs, procedure, time-allotments, the whole machinery of education, will be subjected to investigations and tests which will upset many time-honored assumptions. The day of educational opinion will go—and the sway of dominant educational personalities will be much limited. Education today is an incipient science. If the educator of the future takes advantage of his opportunities we may have, perhaps, an actual science. But I am not so confident as some of the speakers seem to be, of seeing the certainty of education being an exact science in my own day and generation.

Now I think I have challenged, in a way, the apparent opinion of both the papers that all products of education are measurable. It is possible to submit certain tests of spiritual values; but such tests must be suitable to the nature of the spiritual product. We naturally come to philosophical questions when we consider any fundamental question. The difficulty is this: when you attempt to measure the purely spiritual by something purely material you have no common unit. There are no common relationships. Many products of education are objective, and here measures may be applied with profit.

FRANK E. SPAULDING, Superintendent of Schools, Newton, Massachusetts.
—As a school administrator charged with the responsibility of the general direction of an educational enterprise whose function it is to take a certain type of raw material and turn that raw material into a finished, or improved, product, I am greatly interested in the problems that have been raised and discussed here this morning, the problems of establishing standards for the

definite measurement of educational results. The school administrator, even more, perhaps, than the teacher, appreciates the importance of comparing results secured under different conditions, of determining their relative values. It is, indeed, a fundamental part of administrative work to make such comparisons constantly. At present, the school administrator is forced to guess at values, to rely chiefly upon his individual opinion, just as teachers do when they mark a pupil's paper. So, as a school administrator, I want to express my hearty appreciation of the purpose and the spirit of the studies which these pioneers are undertaking, studies that are to furnish definite standards of educational measurement.

I want to speak briefly of a standard to which educational products are, must be, constantly referred by the school administrator, and to suggest the great importance of definite educational measurements in connection with this standard. I refer to the financial standard. What does it cost to produce a given result? Of two results produced by equal expenditures of money, which is the more valuable? What investments of money bring the largest returns? How may the money available for the maintenance of a public educational enterprise be used to produce the most valuable results? These are extremely practical educational questions from the administrative standpoint. Whether or not we like even the suggestion of referring educational values to the expense in dollars and cents that went into the production of those values, such reference we must make constantly in practice, if we would conduct efficiently this productive enterprise in which we are engaged.

Now if objective standards of measurement can be worked out and applied in place of the standard of personal opinion, we shall be able to tell with a degree of certainty how to expend educational funds to the best advantage; we shall be able to determine what expenditures bring the largest returns. Let me illustrate with a few concrete facts.

As a part of the educational enterprise for which I am somewhat responsible, there are two high schools, an academic high school and a technical high school. In these two high schools are taught a large number of different subjects, grouped into eight or ten distinct courses. The cost of providing a definite unit of instruction varies quite markedly in the different subjects and in the same subjects in the two schools. Taking as the definite unit five recitations a week for one year—that is, two hundred recitations—for a single pupil, we find that the cost, at the present time, of this amount of instruction in history is in one high school \$10.20, in the other \$11.80. Is the product in one school worth 15 per cent more than that in the other? It costs that much more. In one school it cost last year \$10.60 to give a pupil two hundred recitations in science; in the other school this year it is costing \$16.69 to furnish the same amount of instruction in the same subject. Is the product secured at this higher expense worth 57 per cent more than the product secured at the lower expense? It is costing that much more. In the same school it is costing \$8.20 to provide one unit of instruction in commercial subjects—

stenography, typewriting, bookkeeping, etc.—while it is costing \$17.60 to provide the same unit in household economics, and \$17.93 in shopwork. Are the educational products worked out in the kitchen and the shop worth 115 per cent and 119 per cent more respectively than the product of the commercial rooms? They are costing that much more.

At the present rates it is costing \$201.90 for the instruction necessary to put a pupil through the classical course, \$206.24 to put one through the scientific course, and \$219 to put one through the general course, in the Newton High School; it is costing \$269.77 to put a boy and \$281.63 to put a girl through the technical course, \$336.92 to put a boy and \$319.08 to put a girl through the extra-technical course, and \$191.67 to put a pupil through the commercial course in the Technical High School. Here are extreme variations of over 75 per cent in the cost of instruction in the different courses in the same school. How do the educational values produced compare? When we are in possession of such objective standards of measurement as the discussion this morning leads us to anticipate, we shall be able to answer these questions and scores of similar questions with confidence. But while we are awaiting these standards, we must still answer these questions as best we can. The questions will not wait. We may refuse to face such questions squarely and to answer them consciously, relying upon such grossly imperfect measurements as we are now able to apply—and I suspect this is what most of us do; we may refuse even to formulate such questions; yet we cannot avoid answering them in some way in our practice of school administration.

When the differences in cost are quite extreme, we do not find it so difficult to bring ourselves to a decision concerning the relative values of the products secured from the expenditures. When it was discovered a few years ago that it was costing about a hundred dollars to furnish instruction in Greek to a single pupil—two hundred recitations—we did not hesitate long in our answers to such questions as these. Which is more profitable, to teach ten pupils English, nine pupils history, eight pupils German, ten pupils mechanical drawing, six pupils household economics, or one pupil Greek? In spite of some sentimental prejudice in this matter, to which I am willing to confess, I could find but one answer to all these questions, and we are now investing our money in educational products produced by other studies than Greek. Are we making a mistake? Perhaps so. Hasten the day when we shall have objective standards of measurement on which we can rely!

EDWARD M. HARTWELL, Secretary, Statistics Department, Boston.—When asked to take part in this discussion I was in doubt whether I ought to accept the invitation, as I could only guess at what the papers in the program might suggest to a mere statistician. However, I decided to chance it, as I had other reasons for being interested in a meeting of this Association.

I was a teacher before I became a worker in statistics. Moreover, as a teacher I was one of those who enjoyed the privilege of attending as a student,

in 1874, the second session of the Summer School in Zoölogy, which Professor Louis Agassiz had started the year before. And in 1875 I was with Professor Shaler's Harvard School of Geology at Cumberland Gap, in Kentucky.

Thanks to the initiative of Professors Agassiz and Shaler, Harvard University, a little later, established laboratories and museums for teachers of this vicinity, thus providing the material out of which this Association has grown and developed.

Even in those days criticism of the secondary schools and their curriculum found voice, although no one had the hardihood to avow a belief in scientific pedagogy. I remember a meeting of the High-School Teachers' Association at which the professor of English in the Institute of Technology, then in its callow youth, vigorously attacked the study of Greek and such like rubbish, which attack was warmly repelled by President Eliot.

Wendell Phillips argued that the public schools ought to make a place in their curriculum for vocational training; but his doctrine was so novel and heretical that he made but slight impression on public opinion. Meanwhile the times have greatly changed. Latterly dissatisfaction with the ideals and methods of the secondary schools, and of our colleges and universities, has grown apace. Criticism of results has become clamorous, and discordant as well. The practical man, so called, is especially insistent in his demands for results, such results as the wayfaring man, though only self-educated, can comprehend and approve.

Go to, cry the apostles of business efficiency and cost-accounting; let us standardize the schools in conformity with the maxims of the market-place and the manufactory, so that we can measure and appraise their output.

Doubtless the scientific admeasurement of measurable quantities may be made to yield valuable criteria of the efficiency of certain methods and procedures pertaining to school life and administration. But the measurements must be made by patient and skilful measurers, who can be depended on to winnow and classify their results and not jump at conclusions.

My inclination is to welcome the attempt to extend and render more fruitful the field of school statistics, in which precisely determined, commensurable and comparable data are none too common. Such attempts compel my sympathy and respect. As a statistician one is most largely interested in things that can be counted and measured, and then be so classified and discriminated that their quantitative and causal relations may be determined and interpreted. But I must confess that the glowing accounts of the rapid spread, in the last few years, of comprehensive statistical investigations of schools and scholars does not elate me overmuch. Supposedly professional statisticians not infrequently do such queer things that the prospect of a possibly too-rapid multiplication of amateur school statisticians is not inspiring.

Only a few weeks since, one of the Boston newspapers printed a disturbing statement that, according to the United States Bureau of the Census, the death-rate of Boston for 1911 was 18.5 per thousand of population: the highest of

the eight largest cities in the country. The Census people early in the year, doubtless to impress the public with their up-to-dateness, published a series of death-rates for 1911. But they gave out the Boston death-rate without waiting to ascertain the actual number of deaths in 1911. They estimated the number of deaths for the last third of the year on the basis of the deaths previously recorded. The actual death-rate for the year, using the same estimated population, figured out at 17.1, or 1.4 less per thousand living than the Census' figure. Moreover, due allowance for the very exceptional month of July was not made in the Census estimate of deaths. Deaths in Boston last July numbered 1,270—of which 216 were from the effects of heat—or 345 more than in July, 1910, when there were no fatal heat-strokes. Official estimates of population on a basis for computing annual death-rates are sometimes astonishingly wide of the mark. I knew a health officer who for three consecutive years figured his death-rates on an estimated population of 541,000 (which figure he obtained from a newspaper); but the United States Census enumerators could find but 508,957 people in the city in the third year, which was a Census year. In another large city for three consecutive years 405,000 was used as a basis for computing the death-rate. A year later the Census enumeration amounted to only 325,902, so that the death-rates for the preceding three years were from 3.6 to 3.8 per thousand too low.

When such things are done in the dry tree, what may we not expect in the green?

Undoubtedly there is room for improvement in the matter of keeping school records and the compiling of attendance statistics. There is good reason for the suspicion that the Massachusetts statistics of school attendance have been misleading, particularly as regards the numbers entering and leaving school within a year. The original *Massachusetts School Register* was devised in the thirties by Mr. Lemuel Shattuck, of Boston, a versatile and competent statistician; but he gave no place in it for recording the death of a pupil. Tardiness and absence bulk large in our school records; but they afford us no data for estimating, much less computing, the mortality of either city or country children. So far as I know, they do not enable one to measure the loss of time in the schools caused by disease in general or by school-diseases in particular. If Mr. Ayres knows of any city in the country where the school authorities or the vital statisticians record the deaths of school children, I should like to know its name. I submit that it is high time that the advocates of uniform school records should set about securing data to serve as a basis for comprehensive and trustworthy mortality and morbidity statistics of the school population.

It is not a very difficult matter to pile up figures as to school accommodations and the physical conditions of schools in certain cities. We have recently been informed, as the result of a hygienic survey, that 65 per cent of the school population is below par—does not come up to the normal standard. Dr. Richardson, a prolific English writer on hygiene, used to say that he never saw

a healthy child. Well, one can define and refine his standard of health so that ideally proportioned and endowed persons would be too few to furnish an adequate supply of museum specimens. All of us know a good many healthy children. Any child or man may be pronounced healthy so long as he can do his daily work easily as often as the day's work comes around. When one scrutinizes the statistics which stigmatize two-thirds of the Boston school children as below the normal standard in physique and health, much comfort may be had from the fact that the defects are not organic or constitutional, but of a relatively unimportant sort, like neglected teeth, squint, *et cetera*.

Many a well-meant statistical investigation has broken down because the schedules of inquiry were ill-devised, too elaborate, or too minute. Granted that the data for tabulation are trustworthy, the classification and arrangement of data in congruent groups calls for insight and skill no less than for industry and patience. Sound statistical work is so expensive at every stage that thrifty shopkeepers and efficient inquirers are prone to condemn it, because, according to their lights and standards, results appear incommensurate with their cost.

When I hear that state-wide investigations of schools or school children have been completed in a year, I cannot forbear wondering how many of the investigators were experts, where they came from, how much money they spent, and what they really accomplished.

I believe in putting searching questions when there is a prospect that they will elicit honest and intelligent replies. There is urgent need for determining whether school life stunts or stimulates the normal growth and development of the average school child in respect to body and mind. The ever-increasing demands of the schools upon the tax-levy make it imperative that economic leaks in their administration shall be located and stopped. At present opinion is divided and uncertain as to the functions of the schools and what they should accomplish. In these fields of inquiry exploration must necessarily precede research. Thus far we have had more exploration than research.

In view of the present state of the arts of exploration and research, I am rather glad that the supply of well-equipped school hygienists and statisticians hardly warrants school authorities in adopting ambitious schemes of investigation on a large scale; else we should have a deluge of ill-digested and misleading comparative statistics. The public is inordinately fond of the vain comparative, particularly in its interpretation of statistics relating to population, health, and wealth. How often one finds statistics adulterated or distorted to enable a community or an institution to brag over its compeers!

It is natural that popular education should be influenced by the currents and cross-currents of popular opinion. Just now popular opinion is running strongly in favor of industrial training and commercialized education. Those who are responsible for the guidance of popular education will doubtless be forced to engage in self-examination and to investigate in various directions in order to meet the criticisms and demands of the apostles of business effi-

ciency and to attempt to frame their answers in terms of units of energy and units of cost.

Here in Massachusetts, without due investigation or a well-reasoned plan of reconstruction, the State Board of Education has been revolutionized. Thus far there appears to be no consensus of expert opinion as to the meaning of industrial education, where it should begin and end, or how it should be conducted. Our present predicament seems to me largely owing to the impatient spirit, muddled notions, and hustling methods of the business world. It is only recently that business men have awakened to the commonplace truths that underlie the gospel of business efficiency. So long as most investigations of political corruption lead up to a business man or a group of them, one may be pardoned for some hesitation in accepting business men, as such, at their own valuation. It may be seriously doubted, too, whether, at the present stage of their mental and spiritual development, they are likely to prove the most intelligent and helpful reformers of our school system.

It seems to me that the essential problems of education are problems concerning growth and development; and that in our attempts to evaluate and appraise the results of instruction and training we should strive to adopt such standards of measurement and comparison as are applicable to living beings and their activities, and eschew as inapplicable the criteria by which the efficiency of the builders and operators of dead machines is properly judged. Statistical problems that relate to the development and actions of human beings and of potential and social institutions are the problems which appeal to me most strongly, because I was a biologist before I became a statistician. My plea is that we should discriminate in our investigation and consideration of educational matters between methods and criteria that are applicable to living mechanisms and their activities and those which pertain to the realm of the inventor, the engineer, and the manufacturer.

Lest I seem to be a reactionary and a skeptic, let me express my interest in the papers presented here this morning. The first embodied an attempt to devise a workable method of assigning quantitative values to impressions and qualities. While recognizing the interest attaching to the problem as an exercise in logic and philosophy, I confess that I should not dare to put the proposed scale to a practical use, without receiving careful instruction from Dr. Thorndike.

With Mr. Ayres's main thesis, as I understand, I am in substantial accord. His paper is a very suggestive one. I hope I may have an opportunity to study it carefully. Possibly such study may modify my belief that a preliminary campaign of education as to the nature and limitations of the statistical method is desirable, if trustworthy and illuminative results are to be secured by such extensive investigations as Mr. Ayres advocated.

STRATTON D. BROOKS, Superintendent of Schools, Boston.—I observe that the audience is getting nervous. Perhaps it is well to close this discussion, except for the privilege of the chairman to contribute his mite.

I feel that the school administrator is confronted with a very difficult situation, in that his cost is measurable and his product is not measurable. The public, the business man, the taxpayer knows exactly how much school supplies cost, and how many are furnished, but we are unable to prove to him that the school is delivering a product that is as good as it was forty years ago.

I have been interested, of course, in calling the attention of some gentlemen to the records in my office of the schools of long ago. In fact, we were investigated, and the investigator came with the attitude that the school was not delivering the product that it was bound to deliver. I pointed out to him the forty-five volumes, more or less, that I have, in which I have every paper that was written in an examination long ago in the schools of Boston; and I challenged him to take any book at random, and I would guarantee that any pupil in the eighth grade could write better than any pupil in the file. He did not believe it until he looked at the book; but it was true; and he admitted it at once. He went through it and found page after page upon which the pupil had answered every question with "I don't know." He went farther, and found that whenever a pupil made a mistake in an examination, the same mistake occurred in every paper through the book, which indicated a very radical difference from the methods of education of today; namely, that in that day they learned the answer by heart, and if they knew it, all right; and if not, they wrote down "I don't know." If they had learned it by heart, every last one of them wrote it alike, and incorrectly.

I want to emphasize that the investigations may possibly help us. It may enable us to show that after all the school has a measurable product in some of its phases. We may be able to call in some of the experts who possess ability to inspect the schools; we shall have sufficient material to be able to approach the business man with a certain demonstration that we know something about our business, whatever the statistics are, and as bad as we know they are. Even an investigation, as bad as some of them are, may have this advantage—that the conclusions, if any are made, will be so confusing that the business man cannot understand them; and it will therefore be a valuable asset in our defense of the public schools.

I remember that in 1851 a superintendent of schools for Boston was appointed, and it was enacted that he should be "a genial influence on our schools, but should not otherwise interfere with their operation." In 1912, we have investigating committees which seem to be irritating influences on the schools but do not otherwise interfere with their operation. What shall we do about it? What is the use of taking time and energy for investigation and having nothing come of it? What is the use of coming to this discussion and going home and not doing something about it? The fact is, that, as Mr. Hartwell said, we ought not to be so anxious to know what the other fellow is doing, or whether he is better or worse than we are, but what we are doing ourselves and why we are doing it. If these things can be reduced to terms of measurement, we want the measure made by those men who have the time and

ability to figure it out and bring it to us. If Professor Thorndike can show us a plan whereby we can measure our product, we want it; we want instructions how to use it. For those things not yet reduced to a money standard, we want the judgment standard at least. Here is the difficulty. Some of you believe you cannot measure thought progression in English composition. Professor Thorndike says they are beginning to work out a measure. The trouble is, that those teachers who say it cannot be measured will nevertheless mark one composition 76 and another 76.5. They have done it for years; refusing graduation to pupils who got 74.5 and graduating those who got 75. Now to be sure, we may not get the exact standard ultimately, but we are going to get something more intelligent at least than estimation from the judgment standard. Eighty per cent of the people might agree that one composition was the best one in the lot, and that another was second best, and so on; but 90 per cent of the teachers want to mark on the basis of whether it expresses what the *teacher* has in his mind. The essential point in the estimation of the composition is what the child had in his mind and whether what the child said was 80 per cent or 90 per cent of what the child knew. Since none of you can know what that particular child knew about that particular thing, you can never know whether he expressed 70 per cent or 80 per cent of his own thought. The chances are that he expressed 100 per cent of what was in his mind while he did the writing. He may have known more about it the day before or the day after, but when he was writing, he was putting down all he knew then.

One or two words more and I have done. Some time ago, we tried to find out with regard to the financial condition of the Boston public schools because we wanted more money than the authorities in the City Hall and in the Legislature would allow us. We found no city in the United States that had statistics about finances that were anywhere near true or had anything to do with the real facts. They had averaged the evening-school pupils at \$5 each, grade pupils at \$35, high-school pupils at \$100 each, and struck a general average. And they knew so little as to believe that that would tell the truth, when it was readily possible, by changing the percentage of pupils, to spend \$2 per pupil more on every pupil in the school and have a smaller average at the end of the year; or, reversing it, to spend \$2 less and have a larger average. Consequently, we have attempted to revamp that somewhat. Those of you who are principals of elementary schools in Boston know that we know and you know exactly the amount spent in such schools and upon what items. That has come to be a very valuable form of statistics.

TESTS OF COLLEGE EFFICIENCY¹

CLYDE FURST

Secretary of the Carnegie Foundation for the Advancement of Teaching

The Carnegie Foundation for the Advancement of Teaching from its inception has been interested, not only in improving the financial status of the professor, but also in advancing the fundamental interests of education in every way in its power. Its central position among educational institutions soon made it clear that educational aims and ends were usually apprehended in a very general way, without any very close questioning as to whether the methods for the attainment of these ends were well or ill advised and administered; whether the ends were measurably attained; and whether their cost in time and human effort was less than might be expected, or proper, or quite unjustifiable. It was obvious that it might be of value, and certain that it would be interesting and suggestive, if these aims could be stated, these methods tested, and these results appraised, with measurable definiteness. In any case, a fuller study of existing conditions could be nothing but helpful. Almost immediately, therefore, the attention of the Foundation was directed to educational standards and tests.

Some of the earlier tests were of a very obvious character. For example, in carrying out the requirement of its charter that its financial benefits be restricted to undenominational institutions, it soon became plain that a denominational test was not applicable to a primarily educational institution. Denominational interest in educational efficiency might be broad and deep, but it was, after all, secondary.

Again, the study of the corporate organization of educational institutions very early indicated the limitations of certain forms of such organization. Thus the general tests of corporate efficiency would question the size of those boards of trustees that have as few as five or as many as eighty members. The qualifications for,

¹ An address delivered before the Harvard Teachers' Association, Cambridge, Massachusetts, March 9, 1912.

and the term of office on, such boards are also illuminated by corporate experience. The accumulation of knowledge concerning such organizations, and its comparative study, may result in the formulation of a standard that may be considered a normal form. The Foundation hopes soon to publish some such data with its suggestions. Other organizations, also, like the constitutional commission of the University of Illinois, are working upon the problem.

Certain financial tests are suggestive for even so alien a matter as educational activity. *Bulletin No. 2* of the Foundation, dealing with the financial status of the professor, introduced one important measure: that proportion of the total income of an institution which is spent for instruction. The comparative display, also, in that bulletin of the average salaries of the various ranks of the instructing staff in 140 universities and colleges constituted a test of efficiency that has already caused a general improvement in conditions.

One must admit that the test of publicity, the open measurement of practice by theory, is sadly effective. Our ideals are so high, and it is so much easier to pretend than to fulfil, that one may almost say that the truest measure of an institution is that which it wishes most to conceal.

Tests of comparison depend largely upon the adequacy of the reporting and recording machinery. In financial matters this is so different among different institutions, and often so puzzling, that the Foundation issued as its *Bulletin No. 3* a set of standard forms for financial reporting for educational institutions. These represent the experience and judgment of many institutions, accountants, and financiers, and are being used each year by an increasing number of institutions with gratifying results.

Better than comparative tests are those that are relative, that is, those that show the status of any item among a considerable number of similar items. Thus it is interesting to know that one institution has more endowment than another, or that the value of its endowment is greater than that of its equipment. But it is far more suggestive to know that it is one of the happy one-fifth of the institutions in the country that have more endowment than

equipment, or one of the very few that added more to endowment than to equipment during the last ten years. This relation between endowment and equipment is suggestive, not only of an institution's status, but also of its aims. The test of relative status may be applied in many ways. One of the 72 institutions on the accepted list of the Foundation, for example, when measured by the percentages of its development in the last ten years, is forty-second in income, fiftieth in endowment, sixtieth in equipment, and sixty-eighth in attendance. Or, put in another way, its attendance increased 5 per cent, its endowment 57 per cent, its equipment 61 per cent, its income 107 per cent, in the decade. There may be many reasons why an institution's income should increase 21 times, and its equipment 12 times, as rapidly as its attendance, but in any case these relative facts suggest profitable directions for further inquiry.

The comparison of such relative positions is further suggestive. Another institution on the accepted list of the Foundation, not far away from, and in the same state as, the former, when measured by the percentages of its development in the decade, is fourteenth in attendance, fifty-fifth in endowment, fifty-ninth in income, and sixty-seventh in equipment. Or, put in another way, its attendance increased 118 per cent, while its endowment increased 29 per cent, its equipment 31 per cent, and its income 40 per cent. That this institution should increase its attendance three times as fast as its endowment, and four times as fast as its income, or its attendance more than twenty times as fast as that of its neighbor, while its income increased less than half as fast, suggests that a comparative study of these two neighboring, but not neighborly, institutions would be very illuminating.

Measurement by concrete standards is possible in some fields. Thus in medical education, *Bulletin No. 4* of the Foundation described each of our 155 medical schools and arranged them in something like an order of merit. When it became evident that these schools were producing three times as many physicians as the country needed, it was obvious that the 100 at the bottom of the list were unnecessary, and probably harmful. It is as gratifying as it is surprising that these schools should have accepted this

judgment and are disappearing at the rate of more than twenty a year. Naturally some of the unfit struggle to survive, but the burden of proof is upon them to justify their existence according to the elaborate standards set by the obviously best 50 or 60. If they cannot do this, they must look forward to death from inanition, unable to acquire further support, unable to meet the requirements of academic and medical societies, and ultimately, of the state medical examinations.

It has been the experience of the Foundation that college-entrance requirements, and the manner of their enforcement, constitute one very definite test of college efficiency. With a few conspicuous exceptions, this matter has been, until recently, in a surprisingly indefinite state. Emphasis on an entrance unit, representing a definite amount of work in the secondary school, together with the earnest co-operation of the various examination and certificate boards, has brought about a most gratifying change in a decade, so that now every college that is worthy of the name endeavors to announce clear and definite requirements for entrance. This has made possible also a clearer realization of the relation between the colleges and the schools and an increasing improvement in their adjustment that has enormously advanced the unification, and hence the efficiency, of our educational system as a whole. A good deal yet remains to be done to perfect this adjustment—the requirements for entrance to even our best colleges are still full of idiosyncrasies that impose a world of petty cares upon the schoolmaster, and there is always more to be said on Plato's problem of whether the egg or the bird is the more important. But this recent definiteness of statement has produced a clarity of alignment that has turned the belligerents from war to arbitration, with the promise of ultimate peace.

This definite statement of entrance requirements has made possible yet another test—that of the enforcement of these requirements. It was certainly a surprise to all concerned to learn from the Foundation's study of the matter in 1907, that so large a proportion of the students entering college were conditioned, as not meeting the printed requirements—58 per cent at Harvard, 57 per cent at Yale, 55 per cent at Princeton, 51 per cent at Columbia, to

say nothing of various other institutions. The publication of this situation was followed by immediate improvement, and it is now truly exceptional for a worthy institution to allow students who are not ready for college to undertake the double difficulty of attempting to do what they are not prepared for, and at the same time to make up their previous lacks. It must be sadly confessed, however, that the most frequent fault met by the Foundation in the institutions that it studies is the failure to enforce published entrance requirements. Some institutions consider seven entrance points a fair equivalent for the fourteen that they require, and others enter students without conditions on school certificates that say, "We cannot certificate this student, he was not graduated, his work was unsatisfactory, and we do not wish this school to be judged by it." The injury of such practices to both college and school is obvious, and their continuance still makes the study of entrance requirements and their enforcement the most definite single test of college efficiency.

The question of entrance requirements leads to the general question of examinations, at entrance and in course—the most general test of college efficiency, although one whose efficacy is now and again questioned. Professor Thorndike has shown that the marks gained by several hundred students in entrance examinations had no direct relation to the marks gained by the same students in the same subjects in college. Professor Dearborn showed that the marks gained in entrance examinations had no direct relation to marks gained by the same students in the same subjects in school, but that the marks gained in course, in both school and college, were directly related. Both studies emphasized the accuracy of course marks over those of entrance examinations, but here again we need a comprehensive body of such studies before we can formulate a doctrine. The tendency to direct examinations toward the measurement of ability, rather than the measure of mere accomplishment, is promising. Yet the large proportion of Phi Beta Kappa men in *Who's Who* is an indication that judgment by examination in the past has agreed pretty closely with later judgment by public repute. The Foundation has recently had the privilege of introducing to our medical societies a practical English

method of examining prospective physicians by judging their diagnosis and prescription for a number of actual patients that they have never seen before.

All examinations, of course, go back to personal judgments, and there is a new scrutiny of the reliability of all such personal tests in our colleges. More than one institution has prepared charts indicating the proportional number of A, B, C, D, and E marks given throughout the institution, and has compared with them the proportional number of such marks given by each professor. There is much to be said on many sides of such a matter, but it is at least suggestive to know that the marks in required courses range lowest, and that they are higher in elective courses, and highest of all in the most advanced and difficult subjects. Personal judgments of students are being recorded and studied in a number of other ways. One very promising system records every term a judgment from each instructor on each student's strength or weakness in health, vitality, and temperament; initiative, progress, and promise; sincerity and genuineness; judgment and prudence; methods of work; causes of success or failure; prospects; expression, especially in English; refinement, cultivation, social qualities, and executive ability. These records are available for the study of professors and faculty committees. Their greatest disadvantage is that the material they present is embarrassingly rich. We should be certainly wiser and, I believe, happier if we could lure more of our psychologists away from their studies of, say, the behavior of penguins in Patagonia, to the investigation of the human records that await their study in the office of the college registrar. Without, indeed, more scientific study of this mass of extremely valuable human data, it seems likely that all of our best-laid schemes of major professors, advisors, preceptors, and the like, for personal aid to student efficiency, will steadily sink toward perfunctory action along the line of least resistance.

There have been a number of suggestive studies of student life, through correlations of academic standing with membership in fraternities and athletic teams, with social classifications, with personal earnings and expenditure, and the like; and we seem considerably nearer standards for action in these than in many other matters.

The qualifications of college teachers are somewhat generally agreed upon, although informally, but tests of the efficiency of teaching are almost everywhere merely personal and comparative, almost nowhere systematic. And yet it would be possible for a group of competent professors, by visiting every class in a college, to select and characterize what appeared to them to be the best teaching, and so to formulate a standard that would constitute both an aim and an ideal. The results of following such a standard would be definitely measurable by the study of the relative successes and failures of students under such teaching. The success of various incentives to student scholarship is measurable in the same way. Or again, it would be possible to formulate from accepted discussions of the teaching process a general procedure, and to formulate from the proceedings of the societies devoted to the various subjects of the curriculum certain definite aims and methods that would be extremely illuminating and helpful. This has been done, although somewhat negatively, for college teaching in the recent publications of the International Commission on the Teaching of Mathematics. Columbia University some years ago arranged a set of public lectures, since published, in which a representative of each department defined the aim and scope of its field of knowledge; it was generally admitted that every department had thus helped itself and every other. Other institutions have found it profitable to provide every professor with printed or mimeographed outlines of every other professor's courses, as a help to mutual understanding and aid. I have seen a set of answers by alumni to a questionnaire asking what courses in college they found most and least helpful, and why. They constituted a striking test of college efficiency in teaching, and yet, I think, by no means an improper one. It might, perhaps, be allowable to collect such judgments from students while in college. The plan has been tried with success in some professional schools.

The curriculum of a college is one of the tests by which it may be measured. The question, "What is a college for?" has been answered in many ways, and curricula vary accordingly, although it must be said that tradition and imitation appear to have been the determining factors oftener than reflection. The extremes of this

variation in curricula approach Dr. Holmes's phrases "something about everything" and, on the other hand, "everything about something." There are many general statements concerning "broad general training," "intensive group systems," and so on. President Foster's correlation between the courses elected in college and future distinction is an example of the many studies of this sort that are needed. Practically, the United States Bureau of Education finds our colleges fairly aware of what they want Freshmen and Sophomores to do, but quite generally undecided as to what should be done with Juniors and Seniors. It would be a great help to have the curricula of, say, our best one hundred colleges displayed together in some sort of tabular form, so that any institution of the hundred might see clearly where it stood in relation to the others in general plan and in emphasis on particular subjects.

The preparation that a college gives for postgraduate work is another test of its efficiency, and the United States Bureau of Education has in preparation a very illuminating classification of several hundred of our colleges, from the point of view of the fitness of their graduates for advanced work, as this has been shown by their accomplishment in our larger universities.

The preparation that a college gives for entrance upon professional study or upon business life is yet another test of its efficiency. President Lowell's recent study of the relation between the accomplishment of the same students in college and afterward in the medical school is most suggestive, and it is greatly to be hoped that it will be followed by similar studies of equally available data at a dozen or a score of our universities, until we have a comprehensive and perhaps a conclusive body of doctrine on the subject.

Colleges are further judged, in a general way, by their alumni, but there has been no thorough study of any alumni list for the determination of its dominant traits, and the subsequent modification of the college to encourage or discourage these traits. It would be most illuminating to see this plan tried by a number of colleges, as it has been by one or two professional schools.

It remains to speak of some of the industrial tests of college efficiency suggested by *Bulletin No. 5* of the Foundation. The

complexity of the educator's problem is such that it was thought that it might be helpful to see whether the managers of industrial establishments, in their recently developed methods for improving their efficiency, had devised any plans that would be applicable to educational institutions. There are some obvious similarities between the industrial and the academic worlds. A university or a college, like any other corporation, is organized and administered through a president, a controlling board, heads of departments, and a working staff. Both organizations are expected to manage their income and expenditure wisely, and to make satisfactory records and give adequate reports of their financial stewardship. Some, therefore, of the measures of efficiency in these matters in business corporations are directly applicable to educational organizations. The financial situation in which numerous universities are now expending hitherto unparalleled incomes, and are yet finding them inadequate, might, especially, be illuminated by such a study.

There are, moreover, other educational activities for which industrial measurements have not hitherto been used, but for which they might possibly be suggestive.

In order to test these possibilities, the Foundation requested an industrial engineer of university training, who was an expert in the organization of industrial establishments, to study certain academic activities in the same way that he would study a manufacturing establishment. His examination was made and his report published by the Foundation in 1910. Eight universities and colleges were visited, and in each a study was made of the department of physics, as a representative subject involving characteristic features of lectures and recitations, laboratory and research work. Measurements of efficiency that would prove applicable to teaching and research in physics would be adaptable to certain other subjects and, no doubt, suggestive for all. The inquiry was made, and aided by the institutions, in a thorough spirit of co-operation for the common good, the investigator repeatedly recording the open-mindedness and the desire for improvement that he met everywhere.

There appeared, from the outset, to be a conspicuous attitude of individualism in institutions and departments, although there is a great similarity in their problems, and a much greater possibility

of uniformity in standard and procedure than in the industrial world. This attitude of isolation appeared to be due largely to an absence of accepted standardization, that is, of carefully considered statements of aims and methods which could be constantly referred to as an ideal of procedure and an invitation to improvement. No two universities appeared to be meeting the same problem in the same way, nor any one university meeting any problem in any way that was not almost wholly open for further discussion. It would seem that in education, as well as in industry, at least some principles and some procedures ought now to be practically settled, so that the whole need not constantly be gone over again from the beginning, at the risk of superficial conclusions and certain waste of time and energy. The preparation of a written rule of faith and practice in such matters would at least give rise to fruitful discussion. Any standards so recorded would be safe from ill-advised changes, and would furnish a means for comparison and for co-operation with other institutions.

One quantitative measure suggested by industrial practice promises to be increasingly applied to courses, departments, colleges, and universities, namely, the student hour or instruction unit; that is, the number of students in any course multiplied by the number of hours they register for or attend. Such a measure is far more accurate than a mere enumeration of students, including, as this does, full-time, part-time, short-course, summer-session, and extension-teaching attendance. This measure, with some agreement as to the relative values of lecture, recitation, laboratory, studio, and shop hours, furnishes a sound basis for comparing the amount of work done in different grades, subjects, departments, and institutions in the same or in different years. At present some departments and institutions are made up to a considerable extent of students that other departments and institutions do not count at all, and equable comparisons are impossible. The student hour also provides a method of estimating departmental costs that has already proved so effective that some institutions that have tried it have not dared to make their findings public.

The individual or military management of departments, usually based on the age or service of the chief, appeared to the industrial

investigator to be giving way to committee management; this was felt to aid free discussion, solidarity of staff, and a general democracy. Committees, however, often lack the responsibility, initiative, and authority to correct abuses or meet new situations, and they notably interrupt and waste the time of specialists in matters in which they are not expert. I know of one university that has fifty-three faculty committees. One college has seventy-three. Industrial organization would substitute a so-called functional management that would allow the specialist authority and freedom in the field in which he is expert, and free him from the claims of anything else. The responsibility of such management is guarded by carefully written standards that are capable of demonstration and are always open to equally careful appraisal and revision.

No captain or lieutenant of industry would attempt to do so many things as a college professor, who carries on research and publication; lectures on the most advanced subjects in his field; chooses, directs, and inspires his staff; supervises his building, laboratories, and shops; engages in general university administration; maintains discipline among his students; and keeps in touch with graduates and prospective students. He cannot do all of these things well; and both his, and every other interest of the institution, would be advanced if he did only those things that he could do best and left the others to those who could do them best. The rapid advance of knowledge with its demand for research, and the growing need of adapting knowledge to changing social conditions with its demand for good teaching, make it essential that the investigator and the teacher be relieved of demands that can be met equally well by others. The teachers in the departments that were studied spent only one-third of their working hours with their students, one-sixth of their time being occupied by miscellaneous duties. Many disciplinary, financial, clerical, and janitorial activities could have been performed better by others. On the other hand, one department was found to have worked up standard lecture notes for introductory courses. These were used and improved by all members of the department until the lectures became vastly better than the average. Their preparation really aided the advance of the science, besides saving most of the time

that young instructors would have spent in working up courses that could not in the nature of things have been one-tenth so good. Such specialization of departmental organization and procedure would increase the earlier usefulness of new members of departments, would overcome the general lack of accurate knowledge concerning the work in any department or specialty, would permit an institution or various institutions to refer their problems to the one man who would be best able to solve them, and would facilitate the selection and exchange among institutions of prominent specialists. Everywhere there appeared to the investigator to be opportunity for both greater specialization and greater co-operation. The curious academic fear of intrusting anything to anybody else has been noted and reprehended elsewhere also, as in Professor Moore's recent examination of the school system of East Orange. "Boards of education almost everywhere," he says, "perform many duties . . . that should be performed by the educators whom they employ; . . . superintendents perform more than their share of administrative work and leave too little for their principals and teachers to decide and adjust; . . . principals are too apt to arrange everything for their teachers . . . and the great and besetting sin of teachers . . . is to teach too much."

Research appeared to the investigator to be considered the most important work of a department or an institution. All institutions hoped to do more of it, and most professors wished that they might do less teaching and more investigation. A number of learned societies refuse to receive papers devoted to the educational side of their fields. This attitude sometimes urges research upon those whose abilities are best suited to teaching: the teacher alone cannot look for the highest advancement. Some of this emphasis on research and publication is apparently due to a demand for established efficiency. A part of it might be removed if there were equally adequate measures and records of efficiency in teaching and administration. With this strong bent in the direction of research, there is a minimum of organization, control, or inspection. Departments in which research is difficult complain that their funds are given to departments in which research is easier. The undergraduate colleges of our universities complain that their funds

are deflected to the graduate schools. Opportunity and funds for research depend largely upon the personal relations of the worker with the head of his department, and of that head with the makers of the budget. A board or an individual who should give as much care to the organization and guidance of research, as is given to the organization of the curriculum or the choice of electives, might discourage the futile, encourage the promising, aid in the co-operation of departments and institutions, and so guide expenditures that teaching should not suffer nor academic favoritism profit unduly. At the eight institutions studied, one-third of the expenditure for physics went for research, money being drawn in every case from the general funds for the purpose, with no clear reporting of the relative expenditure for teaching and research. It may be that this lack of university organization for research has been one cause of great endowments for research apart from the universities.

It was perhaps to be expected that an industrial engineer should find unbusiness-like methods general in the use of educational buildings, the lack of central purchasing-agencies and storerooms, central management and care of grounds and buildings, central handling of records, money, and mail, of publicity, discipline, and the like—all according to definite written standards that are prepared by experts in such matters and are open to approval or suggested amendment by anyone whose judgment is of value. Happily, college secretaries, registrars, and financial officers are already alive to these matters, and only good can come from such investigation of their procedure as they have undertaken.

A bureau of inspection is perhaps too industrial a device to be easily adaptable to educational institutions, and yet efficiency demands that competent judgment should be constantly exercised concerning the quality of the work of every part of the institution, and the industrial principle of separating work and inspection is sound. Such scrutiny of educational work as exists at present is generally so informal that it might be greatly helped by some effective, although unobjectionable, organization. Perhaps the chief lesson drawn by President Taft, in his recent message on the experience of his commission for studying the efficiency of the government business officers, is the necessity of having experts in

organization aside from those who are engaged in the routine of administration.

There is, then, no lack of tests of college efficiency, corporate, financial, and industrial; of organization and management; of entrance requirements, curricula, teaching, research, and examination; of individualism, specialization, standardization, and co-operation; tests concrete, personal, comparative, and relative; tests scholarly, professional, businesslike, and general. Every one of these may be applied with profit somewhere. There are many others that have not been mentioned, although some of them, like the historic, look back to the wisdom of the ages, and others, like those of psychology, are full of the promise of the future. Many tests have been published by the Foundation from time to time, and the Oberlin College committee on tests of college efficiency listed literally hundreds in its 60-page report in 1909. Our present need is not for more tests, but for a fuller and more frequent application of them. The prospective reward is suggested by Oberlin's record of the results of three years: "A revised curriculum, a higher standard for graduation, improved methods of choosing studies and of registration, provision for closer supervision of student scholarship, and certain advances in the development and adjustment of administrative machinery," besides "a broadening of knowledge and a keener appreciation of college problems by the whole membership of the faculty."

What is perhaps the most important of all—the communal test—still awaits a broader social knowledge and a more active social conscience.

Although no college can live to itself alone, too many of our institutions of learning still represent individual, local, and group ideals and prejudices. In many of our states, as in the District of Columbia, any handful of people may constitute themselves a university and grant degrees, without either having any equipment or giving any instruction. Numerous state treasuries still make appropriation for the unnecessary duplication and the wasteful competition of educational facilities. The same religious denomination founds and encourages half a dozen colleges in the same state. Individual and local ambitions retard educational progress

by the indefinite multiplication of unnecessary institutions. If we had three times as many medical schools as we had need of, the same is certainly true of schools of law, and probably of engineering. At least one-half of our so-called colleges, like the 51 in Pennsylvania and the 52 in Ohio, are unnecessary, and at least one-fourth of them are a hindrance to education. They give their students inferior training, they reduce the support of reputable colleges and high schools, and they injure the cause of education by lowering its repute.

The state scrutiny that is given to all institutions in New York, and the co-operation of institutions that has been shown in the movement for extension teaching in Massachusetts, mark the better way. Such broader knowledge and sympathy are beginning to prevail in many places, and the promise is as bright as the need is large for a national extension of a truly social view of education.

We shall then be ready to profit fully from national comparisons in education. A forthcoming bulletin of the Foundation on "Medical Education in Europe," expresses the hope that we may, some day, combine German exhaustiveness with English practicality, without the defects of either quality. Such salutary international lessons, however, must continue to operate chiefly through the slow process of the imitation of the illuminated by the less fortunate, until the fuller development of that social consciousness that it is the privilege of each of us to share and to promote.

TESTS OF COLLEGE EFFICIENCY¹

EDWIN F. GAY

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I am grateful to the secretary of the Carnegie Foundation for having cleared the way by his comprehensive, interesting, and hopeful survey of the tests of college efficiency. It makes it possible for me, with a clear conscience, to address myself in a general way to the popular guessing contest, "What is the matter with our colleges?"

I wish at the outset to state my concurrence with what has been said concerning the need and utility of the various tests of academic efficiency. I believe we should study such units as the "student-hour" and use these measurements and other business methods so far as they are applicable to our problem—and no farther. There is no doubt that there is need for a more intensive investigation of the work of the college student as related to his preparation for college and his subsequent career. But what I particularly wish to present here are some of the impressions I have received from contact with business men, and their attitude toward college; the views of business men who have not had the advantages of college education—or the disadvantages—as well as of those who are themselves graduates of colleges.

We find some business men who are deeply interested in vocational training, and they are frankly, not to say sharply, critical of our colleges because they think that the college is not doing its duty, is not providing an education of practical utility. I have here an address by a prominent banker of New York, much interested in educational problems. He sums up his view in this mild language: "Apart from the fact that the college does not teach young men anything that will be useful to them in business, my observation has made me suspect that it is deficient in another important particular," that is, that the young men are not taught

¹An address delivered before the Harvard Teachers' Association, Cambridge, Massachusetts, March 9, 1912.

"accuracy, perseverance, and an insatiable appetite for hard work." A college student "is more likely to lose than to gain these qualities. . . . The college policy puts a premium on shiftlessness and inaccuracy." In conclusion, he advises the college students: "Let them study red-blooded men instead of fossils, manufacturing methods instead of archaeological specimens, accounting systems instead of Greek verbs; and I will guarantee that their material rewards, their scientific satisfaction, and their service to humanity will all increase." Now, there is much to justify this attitude, but in my opinion it is shortsighted. The business men who so harshly criticize college graduates tend to judge these awkward fledglings in the first few years after leaving college, the period of adjustment to new conditions, often the most unhappy time in the college graduate's career. They should, instead, pass their judgment on the man ten or twenty years after leaving college. I think, furthermore, that this whole question of what is or is not vocational in our college curriculum is often debated with too limited a vision of the demands which life makes upon a man. A sane and catholic mind, though developed by non-vocational studies, is of high practical value. The dispute reminds me of the experience, told by the Englishwoman who was for some time the physician of the old Emir of Afghanistan. She was a Presbyterian, and the Mohammedan Emir had long arguments with her on doctrinal points. One day when the controversy had been warm, the Emir pointed to a large and deep Chinese bowl which stood on the table between them, and asked her: "What do you see in that bowl?" She answered: "A flower, floating on green water." "No," he said, "I don't see that; I see a dragon, stretching its claws." He paused a moment, and then he said, "Perhaps, when we both are dead, we may see all of life and all of doctrine; we may look down and see that both of us are right."

The college course may well admit some measure of vocational training, and there ought to be more of the vocational spirit in the so-called liberal and cultural studies. But the college stands for what is finest and best worth preserving in our civilization. It aims to acquaint the young, to use Matthew Arnold's phrase, with the best that has been said or done. And I believe, therefore,

that the wholesale condemnation of this aim by one group of our critics among business men is shortsighted and narrow.

But it may well be questioned whether the college fulfils efficiently this purpose. One cannot but be impressed with the large number of college graduates—how large it is impossible to say—who have gone through college and who have come out failing to possess the chief thing that college ought to stimulate, and that is, a keen and abiding interest in things of the mind. College men sometimes say, for instance, "Philosophy? I had all that in college; I am through with that." This is not meant as a general indictment; but many, business men among them, think that college men too often fail to get from college what is best worth while. The fault is not wholly in the college training; it is in part due to the whole social environment. In a recent book on the history of intellectual development in Europe, Crozier asserts, perhaps too dogmatically, that one of the chief characteristics of the English-speaking peoples is their emphasis on character, as compared with German or French emphasis on intellect. This is a one-sided emphasis, and he urges with justice the desirability of a truer balance in the national ideal. The colleges, however, are to a certain extent responsible for the failure to arouse and stimulate intellectual interests, and one important reason, in my opinion, for this defect is the lack of personal relations between teachers and students under the modern development of the lecture system.

I am not an expert in educational history, but I have an impression that we have tended to follow the lead of the German universities in facing the problem of teaching an increasingly large number of students. The lecture method lay readily at hand; it had descended, old and well tried, from the mediaeval university, where it was adapted for the transmission of knowledge under the conditions of the time. It appeared to the nineteenth century a convenient method for imparting instruction to a large student-body, while at the same time the teacher was left comparatively free for what the Germans regarded as the chief thing—research. We in this country had the recitation system, a lean method of instruction, but nevertheless one that gave the teacher personal knowledge of the pupil. To meet our similar problem of large-

scale production, along with the ideal of research we imported also from Germany the lecture system. The lecture has its useful function as one of the tools of instruction, but we have tended to rely too exclusively upon it. And this method, used to excess, has separated teacher and student. The lecturer knows his students not as individuals but as units in an audience. That this condition must be changed is becoming generally recognized, and we are commencing to experiment tentatively with various devices to modify the lecture method. Some development of the tutorial system seems to be indicated as a partial remedy for a real defect in our present practice. We must find some way to break up the large lecture courses; some way to bring keen teachers and small groups of students together.

I should like to call attention to the signs of change here at Harvard. One of them is the movement which seeks to substitute as the degree requirement a final examination in subjects in place of the accumulation of marks in individual courses. This has recently been done in the two Graduate Schools of Divinity and Medicine. And a similar plan is being formulated for undergraduates in one of the most important groups of studies. Intimately bound up with this proposal is the need of personal guidance to students thus preparing for a final examination, and steps are being taken to provide for this need. We shall, I hope, develop a close relationship between competent teachers and smaller groups of students.

Despite all his criticism, we find the business man who has not been through college often thinking with regret of that loss in his career. He sometimes exaggerates his loss; he sometimes overestimates what the college can give. He dreams of the pot of gold at the foot of the rainbow. But the college man goes too far in his shattering of this imagination, when he says that one of the chief advantages of college is that it destroys his illusions as to the mysteries of learning. The pot of gold, it is true, is an illusion. But the treasure is there, and it is a pity to lose the zest of the search. Too many of our students, through lack of personal contact with inspired teachers, fail utterly to discover that what they supposed were arid wastes of learning are really gold-bearing sands.

DISCUSSION

ROBERT F. HERRICK, Attorney at Law, Boston.—When I left home this morning, one of my children said, "You had better not go over there; you will get in too deep." I was a little bit shaken by that, and now I know that she was right. The fact is, that I have learned one very good lesson: If you find anyone who has a tendency to criticize the methods of instruction in colleges, I would suggest that he be invited over here, be asked to listen, and then compelled to state his views.

It has been a great pleasure to hear so much about the work that is going on all over the country in the education of students, work that I know nothing about, and which most of the men I see know nothing about. I have had, however, a little feeling in regard to the effect of a college education on the men who enter business, and some of the professions: I have had a feeling that some things could be done toward making these men more effective. Professor Gay spoke about the pot of gold that the ordinary business man thinks he will find at the end of the rainbow, in college. I think it is actually there; it is actually there, in the shape of the spirit of the education. The men who graduate from college and go into business are always conscious of having found the pot of gold.

In Chicago, I had the good fortune to live among a large number of men, some of whom had been through college, some of them the ordinary schools. All were actually in business. The evenings I spent with one set of men were interesting; with the other set, dull. The college men had books, pictures, lamps, and so on; the other men seemed to live in a dreary sort of way, and not to know how on earth to amuse themselves. The life they had lived in college was a tremendous resource to the college men; a purely practical advantage of knowing how to have a better time; and they thoroughly appreciated it. They knew something about college life; they had found the pot of gold.

My feeling is that we could get what we do out of college, and just a little bit more. The typical college man is the best man to go into business. The men, when they are ready to graduate, as I find them, are fair, open-minded, industrious, very modest, with a keen sense of want of preparation for life, and a tremendous desire to learn, that is, to work; that is their attitude toward life, and it is very nearly perfect. If you compare it with the man not in college, I think you will find that the college man is far better adapted to go on in business life, and other phases of life, than the man who has not had that advantage. But they are to a great extent unready in *little* things, too. I think perhaps some of that want could be remedied. It has seemed to me that all through the education of boys in preparatory schools and colleges there was a lack of definiteness of aim as to what we are going to make out of them. If we are

going to speak of the efficiency of the education, we must have an idea of the kind of product we are trying to get. If you know nothing about the product aimed at you don't know whether the preparation is good. If you assume the object is to fit them for practical work, a good deal is left out that might be supplied. I do not think it is the fault of the teachers. It seems to me that at college it might be possible to bring about a situation whereby it would be possible to prepare these men, by some system, just a little better than they are prepared today. I had the advantage of going to the public schools of Boston, where I had a different kind of training. When I was fifteen, we were taught the elements of bookkeeping and the elements of civil government. When we graduated, at sixteen or seventeen, we had a fair idea of bookkeeping, business arithmetic, and quite a good idea of the working of the American government. I have found that one of my girls, of sixteen, is being taught the same in a girl's school. On the other hand, my boy who hopes to drift into college, knows nothing whatever about bookkeeping and business arithmetic, and has not the faintest idea of the Constitution of the United States, or anything else that has to do with civil government. I cannot help feeling that that might be remedied. Preparatory schools do not give some things that the public schools provide. The college-admission requirements do not encourage any such preparation.

I speak with great diffidence, because I do not know just what the college is doing. It is twenty-two years since I was here. That was at the height of the elective system; we were as free as we could be, and we chose our subjects with a magnificent disregard of any future. The distance of the recitation rooms from the places where we slept, and the number of stairs we had to climb, and all the details of our comfort were carefully considered by us. We made some combinations that have never been surpassed. And we performed a great service, by showing that you cannot entirely trust the students, but must aid them somewhat, in shaping their after-life.

My suggestion is, that perhaps that idea could be carried a little bit farther; and if, instead of relying entirely on the teachers to develop the man for after-life, the college could feel a duty to see that this man is turned out a little better prepared for after-life, it would be a good thing.

Many young graduates just getting ready to go into active life, business, banking, and so on, find that the business man has a feeling that they ought to make good, sooner, or later, but they are pretty unready now, and the business man himself is just a little bit shy of them; he is afraid they won't want to go to work soon enough, or hard enough; and perhaps the college man does not get quite the chance that the boy of a more rough and ready sort does.

My feeling is that it is a little of that readiness for work which the boy needs; it might be worked into the college education, so that these boys could be just a little bit more prepared for after-life. Of course, it is perfectly safe to assume some self-preparation in the case of technical schools like the Institute of Technology; but boys come to college with no idea of what they are

coming after, except that it is going to be a pleasant, comfortable time; and that somehow, somewhere, they are going to get something of advantage out of it. Frequently the boys' parents have no greater intellectual aspirations than the boys themselves; they simply send the boys here because it is the right thing to do. If the policy of the college is to take these boys just as they come, along with the ones who wish to study hard, that may be all right. But if its policy is to assume a duty toward these men, and toward the country and see to it that they are turned out better prepared for practical work, then the college will have done a great deal of good.

A man should not be able to graduate from Harvard College without some idea of the ordinary principles of business, the ordinary principles of political economy; so that, for instance, he should be able to discuss the strike at Lawrence with a certain amount of intelligence. When I was here, a man could have gone through with his eyes closed, and absolutely ignorant of many subjects most essential to a practical education.

STRATTON D. BROOKS, Superintendent of Schools, Boston.—Any test of college efficiency involves deciding, first, what is the purpose of college—what is it meant to accomplish. The point I wish to present is that the ultimate test of any college must be based on the service it renders to the community. The college life, whether cultural or specific, is aimed ultimately at service to the community, and any real test must be made with reference to its effect on the community life, present and future. The colleges I have known most about have a magnificent effect on the high schools. Secondary education in this country has been materially improved by the college influence. It has been in the main an excellent influence. At any rate, any test of college efficiency ought to involve a test of whether its influence on the high schools has been good or bad, and that in turn goes back to the community because the high school is likewise in the service of the community. The colleges contribute much to the general ideals, to the life and to the vigor of the states and of the nation. In these lines its professors and its students render magnificent service, and in so far as they fail to render that service, the efficiency of the college individually is less.

The college renders magnificent service in its research work, material and intellectual; the advances in knowledge are carried forward largely by the research of colleges. The service rendered by some of the state universities is almost beyond estimating.

In testing the college efficiency, we must take into account the college deficiencies. The main problem today is what are the students doing? Standards perhaps would be applied to test the actual accomplishment of the student in the subject during the time in college when he is actually taking it; a magnificent test, provided the subject he takes, if he takes it, will do him any good after he gets it. Assume that the subjects are the proper ones, and that our standards show the students' attainment in them; there still remains the

test of applicability to the service of the community. That brings in the important element of time. When will he do the most good? When ought his efficiency to be tested? What is the time when we can determine best whether he is well trained or not? Is it at graduation or ten years later? The same problem confronts the elementary schools. We omit certain things today in the elementary-school course of study. We deliberately sacrifice the immediate efficiency of the pupil for the sake of his efficiency ten years after he graduates. But we are tested by the public the day the pupil comes out of school. The schools are criticized because we have failed to add a dollar a week to the earning power of a fourteen-year-old child for the sake of adding much more when he is twenty-five. In fact, we can say that any education that can make a fourteen-year-old boy worth a dollar a week more at that age will make him worth ten dollars a week *less* when he is twenty-five years old.

In college, if we put too much emphasis on restricted, specific education, aimed at a particular vocation, we are very likely to tie the man's mind up; we are apt to prevent that expansive habit of mind which will supply the dream and interpret it. Specific education is perhaps illustrated by this story with which I hope to close:

A man stuttered a great deal; he was told of a certain specialist who could cure him; so he went to the specialist, and the specialist said, "What you want to do is to learn a specific and particular thing, and repeat that." And he began with "Peter Piper —" and all the rest of it. After the specified course of training, he could repeat the sentence without a stutter. His friends said, "That is magnificent! That is one of the results of specialization!" He said, "Yes! B-b-b-but I d-d-don't see how I c-c-can work it into a g-g-g-g-general c-c-c-conversation."

DISCUSSION

PROFESSOR SHOREY'S CRITICISM OF EDUCATIONAL PSYCHOLOGY

In the February *School Review* Professor Shorey returns to his attack upon the scientific study of education. He maintains that President Hall in particular and "the overwhelming majority of recent writers on education" in general have been "gulling" the public with pretensions to a scientific mastery of the problems of education which when investigated proves to be only an illusion. He asserts that the professional students of education "have magnified their office and enlarged their claims beyond all reason"; and he proposes to fight over the ground inch by inch "until these pretensions are abated within reasonable limits."

I have already¹ recorded my personal gratification that the scientific study of education has reached a point in its development where it merits the criticism that a man of Professor Shorey's scholarly attainments and keen insight can profitably offer. I am glad to note that he wishes to fight the ground over, inch by inch. The battle, as he suggests, promises to be a long one. Would it not be well, before it proceeds farther, to agree upon a code of honor? Every pioneer movement needs criticism, and I am confident that every professional student of education would heartily welcome criticism of the constructive order. But both sides should "play fair," and Professor Shorey has not "played fair" at every point of the game. He accuses us of distorting facts and of deceiving the public. Have his own writings been irreproachable from this point of view? I do not charge him with an intentional appeal to popular prejudice; I do charge him with misrepresentation which, while I assume it to be accidental, is none the less inconsistent with the very rules that he lays down for our conduct.

I may be pardoned for citing in this connection a very brief reference to my own work which appeared in Professor Shorey's earlier article.² Having singled me out as one of the "experts" against whose interpretation of the dogma of formal discipline he places the combined authority of Plato, Aristotle, Faraday, Mill, Lincoln, President Taft, and Anatole France, it would have been only just (considering the rather formidable handicap under which I suffered) to state my position fairly and frankly. My opinion of the possibilities of mental discipline may not be worth citing, but if it is cited I am justified in demanding (no matter how crude or erroneous my judgment may be) that it be stated correctly.

¹ *School and Home Education*, December, 1911.

² "The Case for the Classics," *School Review*, November, 1910, pp. 607, 608, n.

Again, Professor Shorey¹ deceives the lay public with regard to the men who have opposed the dogma of formal discipline in its traditional interpretation. Can we attribute to accident or ignorance the omission of the name of William James from his list of those opposing the older dogma of formal discipline—James, whose skepticism concerning the dogma first set this little ball of experimentation so merrily a-rolling? Would not both the popular and the scientific prestige of William James have damaged the effect of the contrast that Professor Shorey drew in the purely polemical sentence, "Tastes in authorities differ"? Are we to assume that Professor Shorey (who quotes so liberally from the experimental literature) dwelt in ignorance of James's relation to the movement that he condemns so unsparingly? It is one thing to worry the cargo boats and quite another thing to fire a shot across the bows of a Dreadnaught.

And if Professor Shorey views with so complacent a confidence the verdict of crude experience, if he places the observation of the layman above the controlled experiment of the specialist—why did he fail to mention Mark Twain's keen induction, drawn from his grilling experience in learning "by heart" the islands and sand bars, the capes and headlands, even the farmhouses, the trees, and the clumps of bushes along a thousand miles of the Mississippi? Mark Twain may not have been an Aristotle or a Mill; but he was a fairly keen student of human nature, and when he said that memory can be trained into a very "Colossus of capability, *but only in the matters it is daily drilled on,*" he formulated from a discipline in memorizing (more harrowing, we believe, than any to which Professor Shorey's favorite authorities were subjected) a conclusion that ought in all fairness to have been cited by our critic.

We contend, therefore, that Professor Shorey tempted his public to believe (1) that the specialists in education whom he named were a unit in the opinion that mental discipline is a myth; and (2) that no one not a professional student of education agreed with them.

Nor can we escape the conclusion that Professor Shorey seriously deceived his public when he ignored so disdainfully the positive factors which experimental investigation offers toward the rehabilitation of the disciplinists' contention. The practical difficulty with the older doctrine lay in the looseness of the thinking upon which it rested. When its advocates could no longer consistently speak of the training of mental "faculties" they utilized a still more reprehensible expression, "mental powers." The latter is the more unfortunate term, since it suggests immediately a deceptive analogy with physical force; and, in addition, it carries with it all of the fallacious implications of the older term, "faculties." The "transfer" experiments, if they did nothing else, at least compelled the statement of the doctrine of formal discipline in mental terms rather than in a physical metaphor. "Concepts of method" or "ideals of procedure" refer to mental processes that may be readily recognized and

¹ "The Case for the Classics," p. 607.

somewhat definitely described. More than this, such terms suggest definite conditions that must be fulfilled if the outcomes assumed by the older disciplinists are to be attained. Professor Shorey gives his readers no intimation of this positive gain that has come out of the experiments on "transfer"; and through this neglect he positively encourages a loose, metaphorical, and thoroughly misleading notion of what "mental discipline" means and how it may be achieved.

It has been one of the aims of those who are trying to take the scientific attitude toward educational problems to develop a system of technical terms that would avoid the dangers inhering in a loose, inexact, metaphorical, and equivocal vocabulary. This is one of the first problems that every science must solve. Many of the terms that education must employ refer to subjective processes, and this fact has increased the difficulty of the task. It is no easy matter to think clearly when the terms in which one thinks are not unequivocal. And it was no easy matter to restate the doctrine of mental discipline in unequivocal terms. A goodly number of fairly able men wrestled hard with the problem before the doctrine took the form that is now accepted by most of the professional students of education. This formulation will doubtless be revised in the light of further knowledge; but, even as it now stands, it is vastly more helpful and suggestive than the older form. And, furthermore, it is the result of serious and sincere effort, and, while Professor Shorey is correct when he asserts that some educationists have placed it before the public in a way that would encourage a misinterpretation, he is thoroughly unjust when he extends this indictment to "an overwhelming majority of recent writers on education."

But Professor Shorey himself, perhaps misled by his evident belief that we are a crowd of abandoned charlatans, does not scruple to encourage an equally reprehensible misinterpretation. When he says that there are in general "no laboratory experiments that teach us anything about the higher mental processes which we cannot observe and infer by better and more natural methods,"² he is making an assertion that, for pure dogmatism, could scarcely be matched even in those writings of President Hall that Professor Shorey so strongly condemns. The positive results of experimentation in the realm of the higher mental processes may be meager enough, but to say that, out of these intensive, controlled introspections, nothing has come that could not have been observed and inferred "by other and more natural methods" is quite to misrepresent the primary purpose of experimentation in psychology. The casual observation of mental happenings, like the casual observation of physical phenomena, suggests tentative hypotheses which only *controlled* observation, or experimentation, can permanently establish as valid principles. Psychology, like the physical sciences, has been driven to experimentation because its casual and uncontrolled observations were inconsistent

² *Op. cit.*, p. 607.

with one another. One man said that the mind disciplined in one sphere of activity would for that reason work more efficiently in other fields; another man, equally intelligent, denied this "spread" of discipline. One man said that reflective thinking always involved the presence in consciousness of definite sensory images; another man proclaimed with equal confidence that the most effective thinking was quite barren of images. Only controlled experiment can reconcile these apparent inconsistencies, and we maintain that psychological experiment has done much to clarify our thinking in connection with the two problems just cited.

Thus Professor Shorey, in making a sweeping statement to the effect that *all* experimentation in the higher mental processes has been profitless, deceives his public in a most unfortunate fashion; for he is encouraging the indolent, haphazard manner of deriving general principles rather than a rigorous, strenuous, controlled method. He could certainly fulfil his thoroughly honorable and legitimate function of a critic without recourse to the very methods which he criticizes in us—methods which we all deplore as much as he deplures them, but which perhaps we drop into now and then without intent to deceive, just as he seems to have dropped into them with, I like to believe, the most commendable of motives.

W. C. BAGLEY

THE SCHOOL OF EDUCATION
THE UNIVERSITY OF ILLINOIS

BOOK REVIEWS

Social Aspects of Education: A Book of Sources and Original Discussions, with Annotated Bibliographies. By IRVING KING. New York: Macmillan, 1912. Pp. 425+xv. \$1.60 net.

Dr. King has rendered an important service in preparing this work. Our social progress often waits on those who are able to co-ordinate and render more usable a large number of scattered contributions. What a student has been obliged to hunt for in many periodicals and books and then only found in part is now made available in very satisfactory form. Further than this, the author has furnished an interpretation of the general social movement in education, in which these original documents are set with concise evaluation and comment. The result is that the work is remarkably well unified. It is no small success to have made the work of so many writers unite in a well co-ordinated whole.

There are lists of problems for study and discussion at the close of the various chapters. The references given are very well selected and are made more valuable in many cases by brief comment. There is an excellent index.

For normal school, college, reading circle, and teachers' meeting this promises to be one of the best working textbooks we have.

The author has been giving for some time a course on the social aspects of education. In the preface he says: "The subject of the social relations and implications of education is so large and so vital that it requires separate treatment. Such a course should give a comprehensive and stimulating, as well as practical, survey of educational activities from the point of view of their internal and external social relationships." The problem of the course is stated thus: "First, to what extent may educational forces be regarded as definite avenues of social progress; and, secondly, to what extent may certain educational forces, the school in particular, become more efficient as agencies of instruction as well as more effective promoters of social progress through a recognition of their broader social relationships and their internal character as social groups? In other words there are two sets of relations to take into account, those of the school to society at large, and those within the school itself as a social microcosm."

There is a temptation to quote extensively from Dr. King's well-developed plan, but it will suffice to show the general movement of the material. In Part I there is a wide range, from F. Spencer's *The Education of the Pueblo Child*, and accompanying discussion on social origins, through the rural situation, the home and school, the education of the adult, playground extension, the school garden, industrial and vocational education, and vocational guidance, to social progress and social reform. Part II is equally successful in relating the inner social aspects of education. The spontaneous social life of children and the problems of pupil-participation in school government lead on to the personal factor and the corporate life of the school in relation to moral training. Two chapters which will receive especial attention are "The Social Aspects of Mental Development," with extracts from Royce and Cooley, and "The Social Atmosphere of the School and the Learning Process," with material from Burnham, Dewey, Mead, and Scott.

It is a long time since those who believe that progress in education is largely dependent upon the results of social experimentation have had so adequate a presentation of material for their purposes.

FRANK A. MANNY

BALTIMORE TRAINING SCHOOL FOR TEACHERS

A History of the Ancient World. By GEORGE WILLIS BOTSFORD. New York: 1911. Pp. xx+588. \$1.50 net.

The qualifications of Professor Botsford and the scope and plan of his two earlier secondary textbooks are too well known to need comment. The chief interest of the readers of the *School Review* will lie in a comparison of the new book with its two predecessors. The *History of the Ancient World* was originally intended as a revision of the *Ancient History for Beginners*. It has, however, been so thoroughly rewritten and improved that many teachers will be glad to use it instead of the more difficult, because less systematic, *History of the Orient, Greece, and Rome*.

The changes fall into two classes. First, Professor Botsford has, of course, availed himself of the latest discoveries to bring his work up to date from the standpoint of the scholar. Hence the changes in matter are most numerous in the field of Oriental history and the Mycenaean Age. Teachers who for the past few years have had to give orally to pupils the changed dates in Egyptian and, more especially, Babylonian chronology and explain why the information in the textbook was incorrect will welcome a secondary textbook which takes cognizance of Meyer's and Breasted's work.

Second, from a pedagogical standpoint, the book is far more practical than either of its predecessors. It is fuller than the *Ancient History for Beginners*, containing sufficient material to serve as the basis for a year's work in secondary schools, and is better organized and systematized than the *History of the Orient, Greece, and Rome*. The latter is difficult to use, particularly with students of foreign birth. As in the *Ancient History for Beginners*, the paragraph headings are set off in heavier type, there is a synchronized table of events, and social life and culture are treated as separate topics. For a mature student the incidental treatment of the last subjects, as in the *History of the Orient, Greece, and Rome*, doubtless gives the historical atmosphere better, but the presentation *en bloc* at the end of each period leaves a clearer impression on the young student. It is also an advantage to have the questions scattered through the book instead of massed at the end. Summaries of periods have been added. It is doubtful if it is wise to omit them so early as the Age of Pericles and the Peloponnesian War, even though it be done for the purpose of training the pupils to construct summaries for themselves.

With the addition of paragraphs helping the student to organize and summarize his ideas, condensation of the main body of narrative has been necessary—at the sacrifice frequently of readableness, sometimes of clearness. For example, in the account of the Sicilian Expedition the part of Gylippus and the Spartans is not even mentioned, an omission which gives a really erroneous impression. In the sections on C. Gracchus there is not sufficient emphasis on his favoring of the knights as opposed to the senatorial nobility; the letting of the revenues from the province of Asia is omitted entirely. On p. 169, the details of the maneuvers at Marathon are omitted; they are easy for a class to grasp, and lend vividness to the narrative. On p. 192, it is

difficult to see why Tanagra and Oenophyta should be mentioned, but the result only of Coronea, without the name of the battle, be given. There is also occasional blindness in expression, offering opportunities for miscomprehension on the part of the inexperienced student. One misses the convenient reference table of Roman magistrates and assemblies, and also the marginal references to ancient authorities. The pictures are well chosen and illuminate the subject. Criticism might be made of the choice of a photograph of the temple of Poseidon, Poseidonia, p. 145, to introduce the Doric column: a drawing similar to that of the Ionic column on p. 146 would have brought out the characteristic features more clearly for beginners.

The book, since it is the result of first-hand acquaintance with the authorities, is thereby set apart from many of the compilations in use. This very fact may account for the presentation of only one side of the question in disputed points, for instance the Roman assemblies, where the author does not even mention the possibility of the existence of the *concilium plebis*, as distinct from the *comitia tributa*. Of course an elementary textbook is not the place for marshaling of arguments pro and con, but the pupil might well be given a hint as to which statements are generally accepted and which are open to question.

Mechanically the volume is attractive; paper, print, maps, and illustrations are excellent.

ETHEL E. BEERS

THE MEDILL HIGH SCHOOL
CHICAGO

Laboratory Exercises in Elementary Science for the Younger Pupils in Secondary Schools. By W. E. HOWARD. Ottawa, Ill. Privately published, 1911. Pp. 103.

Introductory Science. By the Teachers of Science in the Bridgeport High School. Bridgeport, Conn. Privately published, 1911. Pp. 73.

There are many high schools in which some sort of elementary-science course is administered as an introduction to the differentiated courses in the several sciences. The total absence of a suitable textbook and the scarcity of material for collateral reading are felt everywhere. These conditions encourage the teachers of successful courses to put their work into print. The two books under consideration appear to have originated in this way.

The book by Howard is divided into four parts, which treat, respectively, physical, chemical, physiographical, and biological topics. In the thirty-four pages given to physics the principal topics are the properties of matter, molecular phenomena, equilibrium, the lever, fluid pressures, heat, and vaporization. The material is simplified in order to adapt it to the first-year pupils, and the total quantity is reduced by wholesale elimination. As to point of view and method, there is no material departure from the traditional presentation in standard texts of physics. This section represents high-school physics after a severe process of pruning.

In a similar manner certain of the more important facts of chemistry are presented in twenty-four pages; physiography gets seven pages; and biology is represented by thirty-four pages, of which eleven deal with animals. The materials of this course are, therefore, precisely those of the standard courses in the sciences represented, but with extensive elimination.

The materials of the Bridgeport course are broadly similar to those which Howard has selected. In fact, the tables of contents in physics and chemistry would be almost identical. Two-thirds of the book is occupied by the physics section, and there is no treatment of biological materials.

Howard's book is predominantly a laboratory manual, but with considerable descriptive matter curiously interwoven, so that it is sometimes difficult for one to know whether one is reading text or laboratory directions. The other book is written as a textbook, but includes directions for thirty-seven experiments. In neither book is there any attempt to correlate the several sciences represented.

Both books appear to be the product of the classroom. They are adapted to the use of first-year pupils, and doubtless will be found serviceable in any school in which it is desired to administer the sort of course which they represent. It must be understood that this course is in fact made up of short courses in physics, chemistry, physiography, and biology, each of which is a separate entity. To the problem of the organization of a general course in science for elementary instruction there is no contribution.

Animal Study, with Directions for Laboratory and Field Work. By W. H. D. MEIER. Boston: Ginn & Co., 1910. Pp. 36. \$0.75.

This book is a combination of laboratory directions and a notebook of the loose-leaf type. The directions for each exercise are printed at the top of a sheet, the remainder being left for the pupil's notes.

The studies begin with the grasshopper and proceed in order through the invertebrates from insects to protozoa. After the protozoa, vertebrates are taken up, beginning with fishes. The groups selected are not studied with equal minuteness. For instance, insects and crustaceans are given fifteen pages, as against three for mammals. The directions are written for use with specific type-animals illustrative of the various groups, with the exception that no types of reptiles, birds, or mammals are named. The exercises upon the mammals point to the library rather than to the laboratory.

The usefulness of published laboratory directions such as these is always a matter of dispute. Doubtless most well-trained teachers will prefer to prepare the directions for their classes. Granted that some such printed directions are desired, there is no reason why most of these should not be found useful.

W. L. EIKENBERRY

THE UNIVERSITY HIGH SCHOOL
CHICAGO

Questions on Shakespeare. I, Introductory; II, First Histories, Poems, Comedies. By ALBERT H. TOLMAN. Chicago: The University of Chicago Press, 1910. Pp. xv+215; x+354. \$0.75; \$1.00.

Questions on Shakespeare is a work in six parts, or more accurately in five parts and an introduction; for the first volume contains no questions. Of the six only the first two are as yet ready.

Part I contains a brief discussion of the uses to which the books may be put and a recommendation of the methods which, under different circumstances, the author recommends. A long paper on Shakespeare's language, another on his verse, and a

fairly full and very carefully selected bibliography of the whole subject complete this volume.

The book may be used, according to the introduction, not only by the teacher, but even as a text to place in the student's hands. In that case it will certainly result that the whole study will become much more cut-and-dried than it would otherwise be. The mere sight of a book full of questions, with the preparation of which the teacher has nothing to do, will suggest a task, and one of which the teacher is only the unintelligent instrument.

The character of the questions is extremely interesting. They may fairly claim to be stimulating in the majority of cases. There are, however, some that are so plainly leading questions that they partake almost of the kindergarten character. These perhaps are intended for the youngest students, but even with them it is doubtful if frank and dogmatic statement is not better than a leading question. An example of a question that might better be an expression of opinion is found in Part II, p. 310: "Is Helena's conduct more alien to our sympathy than it would be to that of an Elizabethan?" It is questionable, too, whether the most inspiring way to use the interesting information found in the paper on Shakespeare's language is to read the generalization given there, and then search the plays for examples of it. It is much more interesting to form one's own generalizations from actual material than to search for proofs of another person's. How to conduct any detailed study of the language of the plays except at the cost of more important things is a problem that the book does not solve. In the case of more advanced students, of course, the work can be done frankly as investigation on plays with which they are already quite familiar.

Such directions as "Comment on the intense but unforced realism of the lines about hunting dogs and hunting" (Part II, p. 313) are surely wrongly worded for a book that is to be placed in the pupils' hands. "Where has he (Shakespeare) ridiculed the excessive or tasteless use of alliteration in verse in a previous comedy?" (Part II, p. 315) seems rather an unnecessary test of memory than a "stimulus to the formation of opinion."

The questions are, however, with remarkably few exceptions, very well put, and most of them are not only provocative of thought on the subject immediately in hand but stimulating to thought in general. Many of them deal with character, and these range from those that obviously call the attention of the unobserving pupil to the fine points in character development, to those that are open to differences of opinion. "Is it true that any firm and strong delineation of character would be inappropriate in portraying the lovers?" (Part II, p. 317) is not a leading question, in spite of its form, and must point to the discovery of a valuable detail in the technique of comedy. Questions that bear directly on dramatic technique in general are, however, rare, and probably it is best that they should be; for the result of such study is to call attention to the differences in dramatic technique of the two ages rather than to build up a definite body of theory in regard to what is permanent in the method of writing for the stage. The questions on sources must of course be only for those who are well advanced in Shakespearean study and who have at hand adequate means for investigation. Theorizing under other circumstances is not only useless but downright harmful, since it leads inevitably to unscholarly habits. The book should contain more explicit warning with regard to these questions.

Certainly the work as a whole cannot be overpraised. Its material is accurate and full, and most useful to the teacher of English literature and to the independent

student. Whether such a book is valuable to the student in a class is not so certain, but as Professor Tolman says, after he has suggested various methods of uses, he does not care how it is used so long as it is used in an interesting and practical way.

The Ontario High School English Grammar. By O. J. Stevenson. Toronto: Canada Publishing Co., 1911. Pp. vi+276. \$0.45.

The *Ontario High School English Grammar* is an unusual grammar in several particulars. Its most notable quality is its logical construction. The method of presentation is synthetic; it begins with words and proceeds to words in combination, their relations to each other and their inflections. Although this is not the natural order for a student who is using the language as his own, it probably insures greater ease of comprehension. The most praiseworthy thing about the book is the fact that it accepts the English language as it is used today in speaking and writing, and not as it would be if it conformed to certain established traditions of grammar, and it systematizes this usage in the most sensible way. The grammar of other languages and the historical antecedents of present-day English are referred to only when they furnish the logical explanation of a form that would otherwise appear quite erratic. These explanations, when they are given, are quite full and accurate. The writers are more nearly unprejudiced than are the writers of any other grammar that the writer of this review is familiar with.

The only place in the book where the facts of the language are not reported truly is in the chapter that deals with the subjunctive. Here the conventional treatment of the subject has had its influence. The grammar has yet to be written that gives an unprejudiced account of the subjunctive as it appears in the best written production of the day. Another fault of the book is the illogicality of its definitions. Many of those given do not cover the ground, and some fail to distinguish contrasted forms. This is not, however, a serious fault, as the examples are so carefully chosen that they make the points clear.

The grammar is of unusual merit. It is a distinct improvement over the ordinary high-school textbook.

FRANK G. TOMPKINS

THE UNIVERSITY OF MICHIGAN

Nature Sketches in Temperate America. By JOSEPH LANE HANCOCK. Chicago: A. C. McClurg & Co., 1911. Pp. xviii+451. With 12 colored plates and 215 figures.

It is refreshing to find a piece of work so full of simply stated first-hand observations as is this book. Dr. Hancock for a long time has been a continuous and careful field-worker, and his liking for the out-of-doors, his keenness of observation, and his enthusiasm in seeking the truth about living things of all kinds have stimulated those who have had the privilege of going afield with him. The infectious enthusiasm of the author is constant throughout his book and should serve to give a genuine scientific interest in nature to many readers. The author believes that "it may be more agreeable to present the subject sometimes from the artistic or aesthetic point of view," and, while the truth of nature should not be sacrificed, it should be so presented "that it may reach a wider circle, thereby serving a greater usefulness." The style of the

book and the illustrations, among which are some fine colored plates, help materially to give a literary and artistic presentation.

In chap. i, on "Evolution and Natural Selection," there is a general statement of leading theories regarding some of the aspects of evolution. Chaps. ii to vi deal respectively with "Adaptations in Animals and Plants," "Protective Resemblance," "Mimicry," "Warning Colors, Terrifying Markings, and Other Protective Devices," and "Animal Behavior." The form of statement of these chapter-headings and the discussion in these chapters give evidence of a belief in purposeful adaptation in plants and animals, a point of view now seriously questioned by biologists. In chap. vii methods of working in the field are presented under the heading, "General Observations and Sketches Afield"; and in chap. viii there is given an "Interpretation of Environment as Exemplified in the Orthoptera." As illustration in this review the last chapter will be treated more fully.

In the author's study of the relation between the orthoptera and their environment he has made use of previous botanical work, which in this regard is in advance of zoological work. It has long been known that as regions change, the types of plant life change, and in some cases it has been known that animal life changes in the same way. The nature of these changes in physical factors and the accompanying or immediately following changes in plant and animal life offer some of the best problems in evolution, and Dr. Hancock's interpretation of an environment through a study of insect life is an important contribution to our knowledge of regional animal evolution. Although animals often range widely throughout the year, their real home is regarded as being the place where they breed and rear their young. Upon this basis of classification the region studied is divided by the author into fifteen groups. In *wet-ground regions*, twenty-one species of locusts and five species of crickets live; in *medium-dry ground*, twenty-eight species of locusts, three of grasshoppers, and eleven of crickets find their homes; in *dry sand*, eleven species of locusts and one of cricket thrive; in *rocky environment*, two species of cockroaches were the only orthopterous inhabitants; *old wood* is a home for two species of cockroaches, two of locusts, and two of crickets; *human residences* furnish homes for four species of cockroaches and one of cricket; *standing grass* is inhabited by eleven species of grasshoppers; *shrubs* are inhabited by three species of katydids, two of grasshoppers, and five of crickets. In each of these and of the other habitats there are forms of orthoptera that are peculiar to it. To the ordinary observer these habitats look much alike; also the orthopterous life seems much the same in each. But to the student, as shown in this book, each habitat is a distinctly different thing, and the insect life shows equally clearly marked character both in form and habit. Here, and all through the book, there are contained most interesting, sometimes startling, descriptions of the life habits of the insects discussed.

O. W. CALDWELL

THE SCHOOL OF EDUCATION
THE UNIVERSITY OF CHICAGO

The New Europe, 1789-1889. By REGINALD W. JEFFERY. Boston: Houghton Mifflin Co., 1911. Pp. xvi+401. \$2.50.

The title of Professor Jeffery's volume promises more than the contents fulfil. Over one-third of the book is devoted to the French Revolution and the Napoleonic wars, and the period from 1815 to 1866 occupies most of the remaining space. Only

about seventy pages are saved for the history of Europe since the Austro-Prussian War. Of course "new" is a relative term; but it raises expectations of a full treatment of the last generation at least. Then again, the history of the French Revolution, the Napoleonic wars, the reconstruction of Europe at the Congress of Vienna, the revolutions of 1830 and 1848, the Crimean War, and the unification of Italy and Germany have been so well and so frequently described that, unless one has some special addition to make to our knowledge of these events, some suggestive point of view for the better elucidation of them or, at least, the recommendation of a virile and pleasing style which refreshes even the most hackneyed stories, one has little justification for putting this old matter before the public again. Professor Jeffery has none of these redeeming features to plead for his book. The tale is told in a perfectly ordinary chronicle style, with most tiresome detail of military movements and the more obvious political negotiations.

At the ends of the chapters are elaborate charts representing the genealogy of ideas. These charts will strike most readers as fantastic and inconclusive, while for college students (for whom the book is written) they must be utterly incomprehensible. One seeks in vain the reason for the choice and location of Professor Jeffery's tablets and diagrams. Why, for example, should a chapter (xi) on the Revolution of 1848 in Germany and Austria have appended to it a table of the pedigree of the royal house of Portugal from 1706 to 1860? Or why at the opening of a chapter (x) on the unsettled condition of Europe from 1830 to 1843 should there be chronicled a list of contemporary events in America, whose connection with Europe was most notably thin in just those years? Or how can an Oxford professor make such blunders as "Leomenie de Brienne" (p. 3), "Napoleon looked on the Papacy as a puny power that could be crushed or moulded as he liked" (p. 129), "1865, Andrew Johnson elected president" (p. 368), Napoleon the "imaginary friend" of the South German States (p. 319)?

Only in the treatment of Bismarck's policy (chaps. xiv, xv) does the author seem to rise to anything like inspiration. His presentation of the great chancellor is full of vigor, and he leaves Bismarck standing out as the one living figure of the book.

With many of Professor Jeffery's conclusions and judgments we take issue, such as the description of the *Rights of Man* as "imposing but inconclusive" (p. 11), and the statement that Bonaparte and Desaix "together fought and defeated M'elas at Marengo" (p. 58). But the ineptitudes of style are far more numerous and annoying than the inaccuracies of statement. In a word, the book seems to us to merit the condemnation of being superfluous.

DAVID S. MUZZEY

THE ETHICAL CULTURE SCHOOL
NEW YORK

Voice Training for School Children. By FRANK R. RIX. New York: A. S. Barnes & Co., 1910. Pp. v+77. \$0.60.

This is a compact compilation of conservative opinions concerning what should be done with children in purely vocal music. That the work is a collection of opinions rather than a logical following-out of a single idea is shown in the lack of uniformity in the directions given to the teacher. Now the point of view is that of the purely formal process in which the results are to be obtained by manipulation of the physical apparatus in certain prescribed ways; at another time the author recognizes that this method of building up bit by bit is inadequate, and lays stress on the necessity of

controlling physical processes by mental pictures or ideas. However, the teacher who does not look for a consistent treatment throughout will find many helpful suggestions. The strong restatement of the practice of well-rounded musical educators—with whom too frequently the directors of boy choirs cannot be classed—of preventing the disastrous break in boys' voices by gradually lowering the pitch of the part sung as the voice changes from a youth's to a man's should help in killing the notion that boys should not sing during the period of mutation.

Education through Music. By C. H. FARNSWORTH. New York: American Book Co., 1909. Pp. 208. \$1.00.

The teacher and the parent who are anxious to make their knowledge of music-instruction more than a list of perfunctory precepts will find much material of value in this volume. Professor Farnsworth is a careful thinker who submits every device and method to close scrutiny and evaluation from a broad educational outlook. In this volume, after outlining his general point of view, he proceeds to follow through, year by year, an ideal scheme of music-instruction for the eight years of the public school. No book has heretofore covered the field in such a comprehensive and disinterested manner. Teachers of any system can gather suggestions from this book, by careful consideration of what is stated, but few will be able to follow out in practice or even to accept in theory, all the steps advocated. Although the book is intended for grade work only, the treatment of the seventh and eighth grades, in which the author advocates little singing, and much stress on music-appreciation and history, will, in many places, be helpful in planning high-school courses. It is to be regretted that the author has felt it necessary to curtail his discussion of a number of movements here and abroad for greater spontaneity, self-expression, and interrelation of music with other subjects in the curriculum. The music of the country is feeling its way into unknown provinces, and Professor Farnsworth could well have stated some of the latest tendencies. A revision of the book should also include an index.

School Hymnal. By HOLLIS DANN. New York: American Book Co., 1910. Pp. 191. \$0.50.

The author has tried to retain the religious category and still introduce a few songs which will meet the demand of youthful spirits. It is stretching the "hymnal" idea pretty far when the conception of dignified national anthems is made to include the rollicking tune of "Dixie," but the inclusion of this, and several other of the better-known folk-songs of the love type, will doubtless add interest to many chapel exercises. The selection of material has been carefully made, and the book should prove helpful in institutions in which the religious atmosphere precludes selecting a songbook purely from a musical point of view. Where, however, it is recognized that song even without a hymn text can be used for character development, a choice can be made from several more suitable volumes, in which the hymn is included as one type of song, and that not the most important.

Art Songs for High School. By WILL EARHART. New York: American Book Co., 1910. Pp. 283. \$0.80.

This is a somewhat better than ordinary collection, but is still along conventional lines. The musical material possesses no special claim to the title of art song, and the arrangements give little evidence of being particularly adapted for high-school use.

Most of the songs require a well-balanced mixed chorus, such as is seldom found in high schools. Little attention is paid to bringing into supple ease through the use of easy melodic parts the tenor and bass voices. Most of the time they must serve menially a monophonic melody given to the sopranos.

Studies of Musical Education: History of Aesthetics. Fifth Series. Being the Papers and Proceedings of the Music Teachers' National Association at Its Thirty-second Meeting, Boston, December, 1910. Hartford, Conn.: Published by the Association: Editorial Office. \$1.60.

With the view of placing in easily obtainable form the best thought on problems of musical education in the United States, the Music Teachers' National Association has been issuing for the past five years a well-bound and well-printed volume of their proceedings. The present volume contains the usual valuable material, and is thus one that should be generally owned by libraries and by earnest students of music throughout our country. Articles of special interest deal with music appreciation, discussed from the point of view of the school, the concert room, and the home; the modern organ; the uses of the mechanical player-piano; and various more technical subjects, such as the teaching of piano, voice, public-school music, and harmony. One of the most interesting topics is the preliminary report of a committee which has undertaken the important and much-needed task of simplifying the subject of music terminology.

The Mastersinger. By FRANK A. RIX. New York: American Book Co., 1910. Pp. 192. \$0.65.

A goodly proportion of the thirty-three choruses in this volume are entitled to the name of mastersongs, and hence are well deserving of commendation as a means of art education for high-school students. Dr. Rix has subjected each of the compositions to more or less arranging, with a view to making it available for many kinds of chorus groups. In the process he has undoubtedly greatly broadened its availability, but with inevitable losses in musical effects. Musicians will, however, pardon most of the faults when they consider how many more pupils will be able to gain, from this book, some knowledge of the splendid choruses of Handel, Mozart, Mendelssohn, Wagner, Gounod, Elgar, Strauss, and other great musicians. But let no director take too literally the frequent statement, "bass optional." A man can hobble on one leg, but this hardly justifies the statement, "left leg optional."

Christmas Carols and Hymns. By HOLLIS DANN. New York: American Book Co., 1910. Pp. 111. \$0.45.

This is a convenient collection of choruses for that most musical celebration of the year, Christmas. All the material is of real musical worth, and hence could well displace the usual booklets which serve choirmasters and Sunday-school superintendents in the preparation of their Christmas programs. There are included the best Christmas hymns, a few of the most attractive chorals, and a few standard anthems. The book will be useful as a supplementary text in many schools, although for this purpose the inclusion of some of the secular Christmas songs of the jolly English type would have made it more available.

PETER W. DYKEMA

THE ETHICAL CULTURE SCHOOL
NEW YORK

BOOKS RECEIVED

EDUCATION

- High School Education: Professional Treatments of the Administrative, Supervisory, and Specifically Pedagogical Functions of Secondary Education, with Special Reference to American Conditions.* Edited by CHARLES HUGHES JOHNSTON. New York: Scribner, 1912. Pp. xxii+555.
- Social Aspects of Education: A Book of Sources and Original Discussions, with Annotated Bibliographies.* By IRVING KING. New York: Macmillan, 1912. Pp. xvi+425. \$1.60 net.
- Agricultural Education in the Public Schools: A Study of Its Development with Particular Reference to the Agencies Concerned.* By BENJAMIN MARSHALL DAVIS. With an Introduction by CHARLES HUBBARD JUDD. Chicago: The University of Chicago Press, 1912. Pp. viii+163. \$1.00 net.
- The Improvement of the Rural Schools.* By ELLWOOD P. CUBBERLEY. (Riverside Educational Monographs, edited by HENRY SUZZALLO.) Boston: Houghton Mifflin Co., 1912. Pp. x+76.
- Farm Boys and Girls.* By WILLIAM A. MCKEEVER. New York: Macmillan, 1912. Pp. xx+326. Illustrated. \$1.50 net.

GREEK, FRENCH, AND GERMAN

- Isocrates' Cyprian Orations: Evagoras, Ad Nicodem, Nicocles aut Cyprii.* Edited, with Introduction and Notes, by EDWARD S. FORSTER. Oxford: The Clarendon Press, 1912. Pp. 160.
- Le Français et sa patrie.* For Elementary Reading in Schools and Colleges. By L. RAYMOND TALBOT. New York: Benjamin H. Sanborn & Co., 1912. Pp. xii+294. Illustrated.
- An Elementary German Grammar.* By E. C. WESSELHOEFT. Boston: D. C. Heath & Co., 1912. Pp. xvi+272. \$0.90.
- Beginners' German.* By MAX WALTER and CARL A. KRAUSE. New York: Scribner, 1912. Pp. xiv+231.

CIVIL GOVERNMENT

- Civil Government, Describing the Various Forms of Government—Local, State, and National—and Discussing the Government of the United States from an Historical Standpoint.* By EDWARD SCHWINN and W. WESLEY STEVENSON. Philadelphia: J. B. Lippincott Co., 1912. Pp. viii+375. With two maps.
- The American Government.* By FREDERIC J. HASKIN. Philadelphia: J. B. Lippincott Co., 1912. Pp. xviii+398. Illustrations from photographs by BARNEY M. CLINEDINST.

SCIENCE

- Applied Physics for Secondary Schools.* By V. D. HAWKINS. New York: Longmans, Green & Co., 1912. Pp. x+199.
- The Clarendon Geography.* Volume I. Part I: Principles of Geography. Part II: The British Isles. Part III: Europe. By F. D. HERBERTSON. Oxford: The Clarendon Press, 1912. Pp. viii+379. With colored maps, 133 illustrations, and numerous exercises.

CURRENT EDUCATIONAL LITERATURE IN THE PERIODICALS*

IRENE WARREN

Librarian, School of Education, The University of Chicago

- ANDERSON, LEWIS F. Industrial education during the Middle Ages. *Educa.* 32:423-29. (Mr. '12.)
- ANTIN, MARY. The immigrant's portion. *Atlan.* 109:518-25. (Ap. '12.)
- BLISS, D. C. Some results of standard tests. *Psychol. Clinic* 6:1-12. (Mr. '12.)
- BOYCE, ARTHUR CLIFTON. Qualities of merit in secondary school teachers. *J. of Educa. Psychol.* 3:144-57. (Mr. '12.)
- BRECK, EMMA J. A new task for the English teacher. *English J.* 1:65-71. (Fe. '12.)
- BRICKER, G. A. Teachers' extension schools. *School R.* 20:266-70. (Ap. '12.)
- BUTLER, NICHOLAS MURRAY. The international influence of the university. *Colum. Univ. Q.* 14:146-53. (Mr. '12.)
- CAJORI, FLORIAN. A review of three famous attacks upon the study of mathematics as a training of the mind. *Pop. Sci. Mo.* 80:373-82. (Ap. '12.)
- CALDWELL, OTIS W. Heat as a topic for the experimental science work of the eighth grade. *El. School T.* 12:370-77. (Ap. '12.)
- CARLEY, PEARL BACKUS. Third-grade history work in the Francis W. Parker School. *El. School T.* 12:349-69. (Ap. '12.)
- (The) Carnegie foundation for the advancement of teaching. *Science* 35:477-85. (29 Mr. '12.)
- CARPENTER, RHYS. The American at Oxford. *Colum. Univ. Q.* 14:128-36. (Mr. '12.)
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- CHRISTIAN, HENRY A. General examinations in a medical school; plan of examination recently adopted at Harvard. *Science* 35:485-87. (29 Mr. '12.)

* *Abbreviations.*—*Atlan.*, Atlantic Monthly; *Colum. Univ. Q.*, Columbia University Quarterly; *Educa.*, Education; *El. School T.*, Elementary School Teacher; *English J.*, English Journal; *J. of Educa. Psychol.*, Journal of Educational Psychology; *Lit. D.*, Literary Digest; *Pedagog. Sem.*, Pedagogical Seminary; *Pop. Sci. Mo.*, Popular Science Monthly; *Psychol. Clinic*, Psychological Clinic; *R. of Rs.*, Review of Reviews; *School and Home Educa.*, School and Home Education; *School R.*, School Review; *Sci. Am.*, Scientific American.

- DOWNES, FREDERICK E. Seven years with unusually gifted pupils. *Psychol. Clinic* 6:13-17. (Mr. '12.)
- EIKENBERRY, WILLIAM LEWIS. The general-science course in the University High School. *School R.* 20:217-27. (Ap. '12.)
- FISHER, S. CAROLYN. Arithmetic and reasoning in children. *Pedagog. Sem.* 19:48-77. (Mr. '12.)
- HICKS, VINNIE C. Organizing child-study work in a small city. *El. School T.* 12:378-82. (Ap. '12.)
- HULST, CORNELIA STEKETEE. The organization of the course in literature in secondary schools. *English J.* 1:72-83. (Fe. '12.)
- Industrial schools in Germany. *Pedagog. Sem.* 19:112-15. (Mr. '12.)
- Investigations of the Carnegie institution. *Science* 35:437-44. (22 Mr. '12.)
- KERSCHENSTEINER, G. The school of the future, a school of manual work. *School and Home Educa.* 31:278-86. (Mr. '12.)
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- MAYER, MARY JOSEPHINE. Vocational training in our public schools. *R. of Rs.* 45:449-56. (Ap. '12.)
- MELVILLE, A. H. An investigation of the function and use of slang. *Pedagog. Sem.* 19:94-100. (Mr. '12.)
- MILLER, W. T. A plan for organized play in a city school. *Educa.* 32:409-13. (Mr. '12.)
- MÜNSTERBERG, HUGO. The German woman. *Atlant.* 109:457-67. (Ap. '12.)
- ORVIS, MARY BURCHARD. A university that goes to the people. *R. of Rs.* 45:457-65. (Ap. '12.)
- OSBORNE, CAROLINE A. The sleep of infancy as related to physical and mental growth. *Pedagog. Sem.* 19:1-47. (Mr. '12.)
- PRESCOTT, SAMUEL C. The teaching of microbiology in colleges of the United States and Canada. *Science* 35:362-66. (8 Mr. '12.)
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- RYNEARSON, EDWARD. The conference hour in the Pittsburgh high schools. *School R.* 20:246-53. (Ap. '12.)
- SAKAKI, YASUSABURO. Some studies on so-called "abnormally intelligent" pupils. *Psychol. Clinic* 6:18-25. (Mr. '12.)

- SHARP, FRANK CHAPMAN, and NEUMANN, HENRY. A course in moral education for the high school. *School R.* 20:228-45. (Ap. '12.)
- SMITH, THEODATE L. Some European institutions for the protection of motherhood and the prevention of infant mortality. *Pedagog. Sem.* 19:101-11. (Mr. '12.)
- . Supplement to bibliography of articles relating to the study of childhood and adolescence which have been published in the Pedagogical Seminary and the American Journal of Psychology. *Pedagog. Sem.* 19:116-22. (Mr. '12.)
- TERMAN, LEWIS M., and CHILDS, H. G. A tentative revision and extension of the Binet-Simon measuring scale of intelligence. *J. of Educa. Psychol.* 3:133-43. (Mr. '12.)
- THOMAS, CHARLES SWAIN. The English course in the high school: the New England view. *English J.* 1:84-94. (Fe. '12.)
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- WETTER, A. A. Great educators. V. Friedrich Froebel. *Educa.* 32:430-35. (Mr. '12.)

